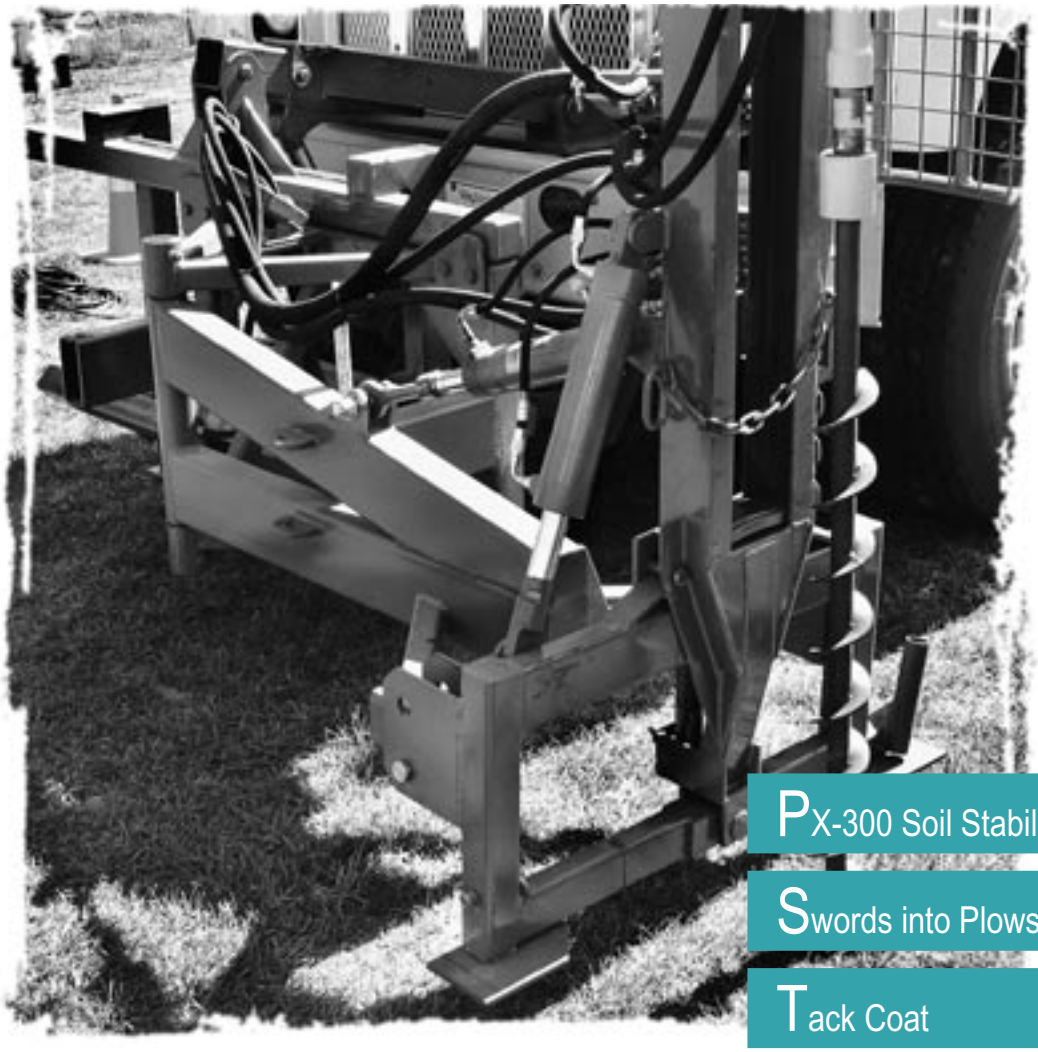
WST2

Washington State Technology Transfer



Washington State Department of Transportation

A Technical Digest of the
Washington State Department of Transportation (WSDOT)
and the Local Technical Assistance Program (LTAP)

Issue 79, Summer 2003

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Article contributions, questions, or comments are welcome. Please contact the editor, Dan Sunde, P.E., WST2 Center, PO Box 47390, Olympia, WA 98504-7390; phone (360) 705-7390, fax (360) 705-6858, or e-mail SundeD@wsdot.wa.gov.

Editor reserves the right to refuse to publish and to edit articles to conform to the standards of our publication.

The opinions expressed in articles are not necessarily those of the editor.

Cover Photo: *Cover Photo by Dan Sunde: WSDOT North Central Region's Delineator Post Punch during its demonstration at the 2002 Pacific Northwest Transportation Technology Expo. It's the third generation of a great mousetrap. NOTE: The Expo has moved to the springtime! Make your plans to participate, May 18 & 19, 2004 at the Grant County Fairgrounds, Moses Lake, WA. See the notice in this issue for details.*

Contents

Subscribe to WST2 Listservs

The WST2 Listservs allow you to retrieve messages from and post messages to a network of mailing lists. There are five Listservs available through the WST2 Center:

Pavement Technology Listserv

Internet Address: http://T2Pave-L@lists.wsdot.wa.gov/guest/RemoteListSummary/T2PAVE_L
E-mail Address: T2PAVE-L@lists.wsdot.wa.gov

Receive periodic technical information on pavement technology and local agency pavement management information, including Northwest Pavement Management Association (NWPMA) information and any late breaking technical information and announcements.

Traffic Safety and Technology Listserv

Internet Address: http://T2SMS-L@lists.wsdot.wa.gov/guest/RemoteListSummary/T2SMS_L
E-mail Address: T2SMS-L@lists.wsdot.wa.gov

Receive information and resources covering the latest in traffic technology, traffic safety, roundabouts, safety management, and safe communities.

WST2 Center Training Listserv

Internet Address: http://T2TRNG-L@lists.wsdot.wa.gov/guest/RemoteListSummary/T2TRNG_L
E-mail Address: T2TRNG-L@lists.wsdot.wa.gov

Receive the quarterly Educational Opportunities and other training information and resources available through the WST2 Center.

Training Resource and Information Network Listserv

Internet Address: http://TRAIN-L@lists.wsdot.wa.gov/guest/RemoteListSummary/TRAIN_L
E-mail Address: TRAIN-L@lists.wsdot.wa.gov

The acronym TRAIN stands for Training Resource And Information Network. TRAIN is a network of inter-agency training departments sharing training resources. This site will be used to post training opportunities, available classes, and news about TRAIN.

WST2 Newsletter Listserv

Internet Address: http://T2News-L@lists.wsdot.wa.gov/guest/RemoteListSummary/T2News_L
E-mail Address: T2News-L@lists.wsdot.wa.gov

This Listserv distributes the WST2 newsletter, a quarterly periodical dedicated to covering a wide range of technical topics to assist Washington State communities and local governmental agencies. This listserv is for distribution purposes only.

To subscribe to any of the WST2 Listservs, follow these procedures:

1. Type the Internet Address of your chosen listserv in your Internet browser address line and enter.

2. Type your e-mail address, select Immediate Delivery, and click the Submit button. You can ignore the Request to Response screen. NOTE: If you wish to unsubscribe from a listserv, enter your e-mail address, select Unsubscribe, and click the Submit button.

3. When you receive e-mail from the listserv requesting address verification for subscription, select reply, and send; there is no need to enter any text in the reply message. You will receive confirmation e-mail and a welcome message from the listserv to which you subscribed.

To post a message to a listserv, type the E-mail Address of your chosen listserv in the e-mail address field, type your message, and send. Your message will be sent to everyone subscribed to that particular listserv.

WST2 Center Listservs are the ultimate information exchange tool. Enjoy!

From the Editor's Desk

Dan Sunde
Technology Transfer Engineer
WST2 Center

What a difference a day makes. This is my second run at this column because things have changed radically since the first version I wrote. Just before going to print with the newsletter, I was offered and accepted the position as Assistant Director of the new Washington State Department of Transportation's Project Control and Reporting Office. I will be leaving the WST2 Center in a couple of weeks to assume my new duties.

Directing the WST2 Center these past five years has been the most rewarding experience of my career and leaving is not easy. I have made many great friends within the state and across the country as part of the greatest program around: the Local Technical Assistance Program (LTAP). The LTAP is truly a family and the support and encouragement I have received from the national LTAP leadership, other T2/LTAP Centers, FHWA, the American Public Works Association, the WST2 Advisory Committee, and Washington's local agencies has been gratifying. Although moving on offers a great opportunity and I look forward to it, leaving the LTAP family is difficult. The LTAP is unique and gets into your blood. I will always see myself as an LTAPer.

I want to thank my staff for their excellence in bringing the WST2 Center to the level it is. Their professionalism, dedication, and hard work have made a challenging job easy and successful. I'd also like to thank them for their patience with and perseverance through all my wild ideas. The next T2 Engineer is in for a treat working with this team.

As I step out, I'd like to give a special thanks to Denny Ingham who hired me as the Director of the WST2 Center and gave me the support and freedom to move it forward.

Between the staff and the WST2 Advisory Committee, I'm leaving the WST2 Center in good hands. In December, the WST2 Center will be working with the Advisory Committee to develop a strategic plan. I encourage you to contact a member of the Advisory Committee to let them know what you would like the WST2 Center to do for you over the next few years. You can find the members and their contact information in the back of the WST2. I challenge you to become active in the WST2 Center by providing your ideas and sharing new information.

Best regards,

Secretary of Transportation
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The Local Technical Assistance Program (LTAP) is a national program financed by the Federal Highway Administration (FHWA) and individual state transportation departments. Administered through Technology Transfer (T2) Centers in each state, LTAP bridges the gap between research and practice by translating state-of-the-art technology into practical application for use by local agency transportation personnel.

Washington State Department of Transportation

U. S. Department of Transportation
Federal Highway Administration

WST2 Advisory Committee

Welcomes Bruce Wagner

Bruce Wagner
Road Operations Division Manager for Pierce County

Bruce Wagner is currently the Road Operations Division Manager for Pierce County. He is responsible for the maintenance of Pierce County's 1,550 miles of roads and bridge infrastructure and manages 177 employees. Bruce has a full understanding of road maintenance and operations, having come up through the ranks over the past ten years. He started out as a Maintenance Technician 1 and promoted through to Division Supervisor prior to his current position. Along with his practical field experience, he has formal training in heavy equipment, diesel and hydraulics maintenance through Bates Vocational Tech, and 10 years experience driving tractor-trailers.

Bruce says, "...The learning opportunities provided by T2 are of great interest to (Pierce County). I welcome the chance to be a committee member and recipient of the (Center's) training opportunities."

Welcome aboard, Bruce.

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Phil Barto

Randy Hart

WST2 Advisory Committee

Changes Leadership

Phil Barto, Spokane County Maintenance Engineer, stepped down as Chair of the WST2 Advisory Committee with his retirement from Spokane County. Phil has been an active and avid supporter of the WST2 Center and has served on the Committee for over eight years, the last two years as Chair of the Committee. Phil has provided the WST2 Center with valuable input that has helped the Center understand the needs of local agencies. He has been very proactive, providing insightful and informative articles for the newsletter on a regular basis. His pragmatic insight and wealth of experience from his 37-year career will be greatly missed.

WSDOT Highways & Local Programs and the WST2 Center would like to take this opportunity to thank Phil for his dedicated support and for sharing his valuable time and experience with the WST2 Center. The local agencies of Washington have benefited from his participation. We wish him the very best in his retirement and future endeavors.

Assuming the helm of the WST2 Advisory Committee is Randy Hart, County Road Administration Board (CRAB) Grants Program Engineer. Randy is another longtime member of the Advisory Committee. He has represented CRAB and its county constituents for over eight years. Randy has been employed with CRAB since 1991. After graduating from the University of Washington in 1980, he worked for a consulting firm in Aberdeen. He also had a wide variety of field and office responsibilities with WSDOT, beginning in 1982 in the Aberdeen field office and later for the Olympic Region in Tumwater and Headquarters in Olympia. Randy commutes from Aberdeen where he resides with his wife Retcy and youngest son Rod.

The WST2 Center looks forward to working with Randy in his new capacity as Chairman.

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The Technology Expo Is Moving

The Pacific Northwest Transportation Technology Expo is moving to spring! Rather than battle the heat and the last minute construction rush, we have moved the Expo to May 18 & 19, 2004 instead of September 2003. Springtime in Moses Lake is beautiful with dry weather and temperatures in the low 70's.

2004
Pacific Northwest
Transportation
Technology Expo

Although the date has changed, the location remains the same: Grant County Fairgrounds, Moses Lake, Washington.

The 2004 Expo is shaping up to be the best ever, with maintenance shops around the state already committing to bringing their Mousetraps. We are anticipating a record number of Mousetraps with a blend of new and old inventions, including second-generation equipment and spin-offs of previous ideas. We plan not only to show the Mousetraps but to demonstrate them too, so you can see how they work. Bring and demo your own ideas! Contact Roger Chappell, WST2 Center, at 360-705-7539 or ChappeR@wsdot.wa.gov, for more information on registering your Mousetrap.

Once again, we plan to have vendors demonstrate new technologies. If you have a particular piece of equipment you would like to see demonstrated, please contact us so we can try to schedule your demonstration. You can contact any of the following:

- Clay Wilcox, WSDOT, at 360-874-3050 or WilcoxC@wsdot.was.gov
- Dan Sunde, WST2 Center, at 360-705-7390 or SundeD@wsdot.wa.gov
- Cathy Nicholas, FHWA, at 360-753-9412 or Cathy.Nicholas@fhwa.dot.gov
- WSU Conferences & Professional Programs at (800) 942-4978 or http://capps.wsu.edu

We'll see you there!

New FHWA Service Designed to Help Public Agency Traffic Professionals

By Al Alonzi, Team Leader Affiliates Program, FHWA Office of Professional Development

FHWA has initiated a new service designed to assist public agencies in effectively applying traffic control devices and the MUTCD. The "Peer-to-Peer for Traffic Control Devices" (P2P TCD) is designed as a no-cost program to:

- Provide short-term assistance in matters related to traffic control devices.
- Address specific technical issues in the MUTCD.
- Spark dialogue and foster an "esprit de corps" among professionals in the transportation community.
- Contribute to a better transportation system-optimized traffic performance and improved safety.

The P2P TCD program is designed to provide an easy-to-use way for practitioners to receive assistance from other practitioners.

How does it work?

Local, county, regional, or state transportation agencies request assistance by email (P2P@fhwa.dot.gov) or calling a toll-free number (1-888-700-PEER). The program coordinator matches transportation professionals who are experienced and knowledgeable in the relevant technical area. The peer, in turn, will contact the agency to work out the details of the assistance to be provided within the program framework. The peer's assistance is short-term and will address specific, technical issues.

The program coordinator matches transportation professionals who are experienced and knowledgeable in the relevant technical area.

It is easy to use the P2P TCD program. Send an email to P2P@fhwa.dot.gov or call toll-free at 1-888-700-PEER (7337). For the opportunity to participate in the program on a less formal basis, visit the Discussion Area on the MUTCD Web site at http://mutcd.fhwa.dot.gov. us

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THE MANUAL ON UNIFORM Pavement Marking Information

For roadway pavement marking engineers and managers, the following website contains information of pavement marking materials used in some states and Federal Lands. http://www.washto-x.org/synopsis/8-13-2002.pdf

Highways and Local Programs Offers Answers to Design Standards Questions

By Al King, P.E., former Operations Engineer, WSDOT Highways & Local Programs

Over the last several years WSDOT Highways and Local Programs (H&LP) have received questions about Design Standards, why they exist and where they must be applied. Informational overviews have been written for both city standards and county standards that outline the requirements under the Revised Code of Washington. They have been posted as informational documents (not directives) on the H&LP web page under the heading "Informational Letters" at http://www.wsdot.wa.gov/TA/Operations/LAG/DirectLetters.htm

The web page also includes other valuable information including copies of Directives, other informational letters, descriptions of state laws, and Letters of Instruction. Topics include:

Directives

- Use of WSDOT/APWA Standard Specifications - November 18, 2002 letter.
- Design Clear Zone - WSDOT Design Manual Supplement, effective November 1, 2002.
- AIA - Bid Bond Form Violates Road & Bridge Specifications.
- Design Deviations - Required on ALL projects, January 28, 1999.

Informational overviews have been written for both city standards and county standards that outline the requirements under the RCW.

Instructional Letters

- LA Instructional Letter 03-02 - Supercedes IL 4020.02 section C.3.c) in Appendix 1, Effective April 23, 2003.
- Instructional Letter 4020.02 - Stormwater Design Requirements and Time Frames, Effective February 25, 2002.
- Instructional Letter 4053.00 - Jurisdiction Over State Highways Within Cities, January 22, 2003.
- LA Instructional Letter 03-01 - Truncated Domes on Curb Ramps, January 21, 2003.

Laws

- Summary of RCW's with WSDOT responsibility that affects city and county transportation programs.

Informational Letters

- WSDOT Design Manual Guidance for Design of Roundabout Intersections - White Paper.
- Application of City and County Design Standards - November 27, 2002.
- Administration of Engineering and Design Related Services Contracts - Guidance supplementing 23 C.F.R. Part 172, October 23, 2002.
- Design Standards on County Roads in Washington State - White Paper.
- Design Standards on City Streets in Washington State - White Paper.
- Design Jurisdiction on State Highways in Cities - Proposed WSDOT Policy.
- Detectable warnings handout, with updated manufacturers list.
- ADAAG Detectable Warnings - FHWA Memorandum (May 6, 2002) on truncated domes.

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For more information, contact Ron Pate, H&LP Standards and Procedures Engineer, at 360-705-7383.

New Guideline Helps States Track Highway Crashes

Cell Phones and other Distractions Included

Reprinted from the Governors Highway Safety Association news release dated June 24, 2003.

The 2nd edition of the Model Minimum Uniform Crash Criteria (MMUCC) Guideline has just been released. Among the new revisions is the recommendation that states collect data on all crashes involving death, personal injury, or property damage of $1,000 or more. Some states only document a crash if there is a death, significant injury, or enough damage to the vehicle that requires it to be towed. The new Guideline also includes a recommendation that states track whether or not driver distraction contributed to the crash.

MMUCC's purpose is to give guidance to states to help them standardize data collected at crash scenes. The goal is to achieve greater uniformity and consistency nationwide in the crash data collection process. These critical data are used by local, state, and federal policy makers to determine trends and prioritize highway safety problem areas as well as develop laws and strategies aimed at reducing deaths and injuries. The Governors Highway Safety Association (GHSA), the National Highway Traffic Safety Administration (NHTSA), the Federal Highway Administration, and the Federal Motor Carrier Safety Administration jointly developed MMUCC with collaboration from numerous state and local agencies.

$1000 Reporting Threshold

A $1000 threshold for crash reporting has significant ramifications for traffic safety policy. It will mean that better statistics will be available to indicate the full impact of traffic crashes and also what factors contribute to their occurrence. Better data will also allow states to target their limited resources more effectively. The $1000 threshold was recommended partly because of concern that states may not be reporting less severe crashes due to the time and expense entailed in the reporting process. Barbara Harsha, GHSA's executive director, and the project director for MMUCC says, "If states implement this new crash reporting threshold, we will have a much better sense of what is really occurring on our nation's roadways." MMUCC's full threshold recommendation encourages states:

"If states implement this new crash reporting threshold, we will have a much better sense of what is really occurring on our nation's roadways."

- To include all crashes statewide involving death, personal injury, or property damage of $1,000 or more. This data should be reported and computerized statewide;
- To report crash data for all persons involved (including the injured and non-injured) to support highway safety's goal of reducing death, injury, injury severity and health care costs resulting from motor vehicle crashes statewide;
- To adopt a reporting threshold that is uniform and consistently implemented statewide.

Driver Distractions

The revised MMUCC Guideline also includes new data elements that will help police and policy makers better gauge the impact of driver distractions, one of the most controversial and prominent issues in highway safety. The new codes that address distractions are for the driver who is:

- Not Distracted
- Distracted by an:
  - Electronic communication device (cell phone, pager)
  - Other electronic communication device (navigation device, palm pilot)
  - Other distraction inside the vehicle (radio, another passenger, etc.)
  - Object outside the vehicle (road sign, another vehicle, etc.)

Harsha says the inclusion of a driver distraction data element is particularly timely given that numerous states are considering legislation to ban hand-held cell phone use while driving. "We do not

really have any idea as to the scope of the driver distraction problem. Including this new data element on police crash forms will help states gain a better understanding of the problem." GHSA has urged states to refrain from enacting hand-held cell phone bans until further research and data are available. Currently, only 16 states are collecting crash data on cell phone usage, but Harsha expects that MMUCC will help that number greatly increase. She adds, "Compiled statistics from crash forms coupled with more research on driver distraction should give policy makers a better body of evidence to use when considering legislation regulating cell phones and other distractions."

The MMUCC revision also includes other emerging issues such as: red light running, drugged driving, booster seat usage by children, hit and run crashes, and special use vehicles (such as the Segway Transporter).

The full MMUCC revision contains 111 data elements, two less than the previous version published in 1998. Harsha says she expects widespread usage of MMUCC because it is not a drastic change from the 1998 version and many states are already implementing most of the elements in the guideline.

The second edition of the MMUCC Guideline, [dated] 2003 was published in June and is available online at www.ghsa.org. MMUCC is coordinated by GHSA and funded by NHTSA.

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The Governors Highway Safety Association (GHSA) is a nonprofit association representing the highway safety offices of states, territories, the District of Columbia, Puerto Rico and the Indian Nation. Its members are appointed by their Governors to administer federal and state highway safety funds and implement state highway safety plans. Contact GHSA at (202) 789-0942 for more information.

Report on the Use of PX-300 Soil Stabilization

By Dave Nichols, Construction Manager, Thurston County Roads & Transportation Services

In August 2002, Thurston County completed a base stabilization project on Tono Road using a new product called PX-300. Following is a report of that project.

Project Information

Tono Road is a two-lane, 3.8-mile Rural Major Collector in southeast Thurston County. The existing bituminous surface treatment (BST) surface was in poor condition with a Pavement Structural Condition (PSC) rating below 40 (0-100 scale) in 1999. Although the average daily traffic (ADT) on the road is only 300 vehicles per day, Tono Road serves as a major access road to a steam power plant operated by TransAlta Centralia Mining Co.

Before construction

Selection of PX-300

Thurston County had completed numerous base stabilization projects in the past using cement treated base with very good results. In early 2002, the County was contacted by a representative of the G.M. Boston Company to discuss the possible use of PX-300 Soil Stabilization Compound, a non-toxic blend of aqueous polymer emulsions which binds soil particles. According to the manufacturer, the product had been used successfully for erosion control, dust control, and base stabilization applications.

Mixing PX-300 into road base

Underlying road base samples were collected and mixed with PX-300, formed into cylinders, and tested for compressive strengths. Results of the compressive strengths ranged from a low of 600 psi to a high of 1,300 psi. Based on the laboratory results, the mix design called for an application rate of 1 gallon of PX-300 for each 66 square feet and a minimum mixing depth of 6 inches. Based on the mix design, it was determined that approximately 8,000 gallons of PX-300 was needed for the project, which required one hundred forty-four 55-gallon drums.

The Plan

Based on the County's past experience with base stabilization projects utilizing Portland cement, it was proposed to use a similar process on the Tono Road project, which consisted of:

- Pulverizing the existing pavement to meet 1 inch minus gradation.
- Mixing PX-300 into water truck at 10:1 ratio.
- Using the water truck/road reclaimer as a train, meter the PX-300 into the mixing chamber at a minimum depth of 6 inches.
- Grading, shaping, and compacting to be completed by County forces to achieve a final width of 24 feet.
- After proper curing, surface the road with a Bituminous Surface Treatment Class A (double shot).

Grader shaping and blending

The Construction Process

The low ADT on Tono Road and the availability of an alternate route allowed the road to be closed to through traffic for the duration of the construction. This proved to be an important factor after construction was completed.

The County awarded a contract to M&M Road Recycle, Inc. to complete the pulverizing of the existing pavement and mixing of the PX-300. Five working days were used to pulverize the 3.8 miles. County forces used a grader and steel-wheeled compactor to shape the road and a water truck to control dust.

Loading Part A into Water trucks

Transferring the PX-300 from the drums into water trucks was a key construction sequence. PX-300 is shipped in two components: Part A, which is shipped in the 55-gallon drums and has a consistency similar to house paint and is pure white in color, and Part B, which is shipped in 10 gallon buckets. The contractor used a trash pump with a 5-hp gas engine to transfer the material from the drums. After the pump was primed, it took about a minute to empty each drum. Each 4,000-gallon water truck required seven 55-gallon drums of Part A and 10 gallons of Part B, which was added manually.

Equipment used for the mixing process were:

- CMI RS650 Reclaimer/Stabilizer (contractor)
- Two 4,000-gallon water trucks (contractor)
- Two Caterpillar graders (County)
- Double-drum steel wheeled roller (County)
- Vibratory sheep's-foot roller (County)

Mixing the road material with PX-300 began on August 12, 2002. The weather was overcast and cool in the morning with clearing and warming in the afternoon. Closing the road allowed the mixing and grading to be performed in sections over the entire width. The water trucks were connected to the CMI RS650 and the PX-300 was metered into the mixing chamber at the specified rate. The sheep's-foot roller provided initial compaction directly behind the mixing operation, followed by the road graders for blending and shaping. The vibratory steel drum roller completed final compaction.

During the final rolling of a 1000-foot test section, excess moisture was noticed on the surface of the road. To avoid pumping any excess moisture into the base material, the decision was made to complete the finish rolling using static mode only. This construction process continued over the next five days. Over the course of the construction, there were numerous soft areas that appeared to be pumping excess moisture. Possible causes could have been excess moisture in the subgrade and/or problems with uniform mixing of the PX-300.

Post Construction

After construction was complete, the road remained closed to reduce traffic damage while the road cured. The weather the following week was warm and dry but areas that had shown signs of pumping were not curing as predicted. In addition, the surface began to ravel and did not exhibit signs that the treated material was properly bonding. Samples were taken from two test holes dug in the areas that were still pumping. It appeared that the PX-300 was still present but had not cured. Additional samples were taken from two other test holes located in areas where the surface was raveling. These samples revealed minimum cementing of the road material.

Final compaction using steel-wheeled roller

The second week after construction, the decision was made to re-mix (using a road grader) and re-compact the areas that remained

After construction

soft and then tight blade the entire road. This operation seemed to improve the condition somewhat, and the road was opened to traffic with a 25 mph speed limit.

Based on the surface condition and the late construction season, County staff decided not to apply a chip seal surface. Using some construction reserve funds, it was decided to pave the road with 3" Asphalt Concrete Pavement Class A.

Construction Costs

PX-300 FOB Bucoda, WA.	$125,180
Contract M&M Road Recycle, Inc.	$29,161
Thurston County Labor & Equipment	$70,907
Asphalt Paving	$317,600
Total	**$542,848**
Unit Cost	**$10.15/SY**

Conclusions

Based on engineering analysis done before, during, and after construction, here is what is known:

- PX-300 mixed with road base materials in the lab successfully bound the materials to increase compressive strengths.
- The product was manufactured according to manufacturer specifications.
- The application process by the contractor and Thurston County was conducted in accordance with G.M. Boston recommendations and specifications.
- Due to unforeseen factors, the PX-300 material did not perform in the field as expected.

In April 2003, Thurston County staff completed pavement cores and samples of the underlying material at three locations along the road. The use of the coring machine was unsuccessful in trying to extract a solid core of the treated material. However, technicians used a steel bar to break the material apart sufficiently to collect a sample, indicating that the treated material had developed reasonably high compressive strengths. To date, the road is performing well.

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For further information, please contact Dave Nichols, Thurston County Construction Manager, at 360-754-3355 x7817 or nichold@co.thurston.wa.us.

Sketching in Excel, Word & PowerPoint

By John C. Heinley, P.E.,
Environmental Engineer, WSDOT
Highways & Local Programs

How do most engineers, architects, and planners communicate? And yes, we do communicate. But to answer this question, I need to tell you a little story.

An engineer, architect, and planner were called upon to resolve an age-old problem - what is two plus two? For this exercise, plain text would not be sufficient. The engineer approached the problem using her training in Calculus and Physics to derive the following equation:

The architect determined that a much simpler mathematical operation would suffice, but the presentation would, of course, require an artistic touch:

The planner was a real bottom-line kind of guy. He called the project manager and budget manager, arranged a meeting, and did a PowerPoint presentation. He said, "Here's the deal. You give me $50,000 and I'll make two plus two equal whatever you want it to be."

In each case, the engineer, architect, and planner used a combination of graphics, mathematics, and text to demonstrate a solution to a problem. Either by ourselves or in a group, we use a sketchpad, calculator, a straightedge (if necessary), and notes to test a hypothesis or idea, make changes, and discuss as necessary. Drafting technicians often take these hand-made drawings or use electronic files from design software packages to create plans.

In some cases, being able to create a schematic drawing electronically can be very useful for the average engineering professional. The drawing can be saved and then modified or e-mailed to a colleague, modified or accepted, and then sent back by e-mail. These types of drawings don't substitute for CADD-based plan sheets, which have exact scale and are later used in the official plans. However, the drawings are useful in developing ideas informally or in reports that do not need scaled plan sheets.

Of course, as you can see with the equations above, there are relative advantages and limitations depending on what program you use to do your sketch. With using Excel — with a spreadsheet inserted into a Word document — the alignment of lines can be controlled exactly, and the ALT and Shift keys can be used to snap to gridline intersections or keep a line parallel to another line (more on that later). Using Word, the basic commands and tools are still available, with end-point locations affected by text size, but text is much easier to manipulate. And of course, PowerPoint still has the sketching tool.

There are other software packages that have similar capabilities. As I am familiar with Microsoft products, which are the level-playing field software for the Washington State Department of Transportation, I will demonstrate sketching techniques using Microsoft software.

How To Draw A Simple Map

First, set the rows and columns so that they appear to be equal in size, especially if you are used to using graph paper. Try a row height of about 18, and a column width of about 3; adjust as necessary. If desired, you can even select a range of cells that covers your whole drawing, specify a line-style and color, and calibrate for your printer so that the cells form an approximate scale.

Second, select a drawing tool from the Drawing toolbar. Try the line drawing tool first. Once selected, your cursor will turn into crosshairs. Choose a starting point, click and hold, and drag your mouse to the desired end-point. A small square (which is used to adjust the length, orientation, and any other parameters of the object) will appear at each end of the line. You can even copy, move, and paste this object, just as any other. In addition, you can group an object with other objects — see below.

Third, try another drawing tool. The AutoShapes tool has a number of pre-set shapes, as well as access to a scribble tool and other features. Select a triangle. Click on your electronic graph paper. Et voila - you have a triangle that has small squares and a yellow adjustment tab. You can adjust the size or relative shape with the squares and other appearances with the yellow

adjustment tab; experiment. If you don't like what it looks like, click on the Edit pull-down menu and select Undo.

Next, click on the line, then hold the Shift key down and click on the triangle. Go to the Draw pull-down menu on the Drawing toolbar and select Group. You can now adjust the size or move the combined drawing or even spin it by selecting the Rotate tool.

Now, use the Draw pull-down menu and select Ungroup to ungroup the line and triangle object. Select the line. While holding down the ALT key, drag one of the end-points of the line until it snaps to a grid intersection. Pretty neat, huh?

Maps are used to guide people to a location or show the relative boundaries of a project, etc. Here are two examples made in Excel, shown as Figures 1 and 2.

I've used the sketching feature in Excel as a design aide and as a tool to calculate pipe-manhole intersections and profile lines, on-ramp/off-ramp lengths, and in design visualization. The calculation abilities in Excel are somewhat obvious, but the ability to visualize a given design may not be readily apparent. In Figure 3 below, a recent field trip and a digital camera shows just some of the possibilities of a good sketch.

The bridge sketch also uses the 3-D feature on the bridge piers, as well as gradient adjusted colors. With a little practice, imagination, and effort you can create visualization graphics to show how a given project might affect the existing environment.

File Size - Importing vs. Creating

Sketches created in one file can be copied to another file. However, I've noticed (especially in creating this article) that this can result in files that are several times larger than if the same information was re-created in the target file. Make sure the file is not too large if you are thinking about e-mailing it.

Note: Other programs (e.g. MacDraw, Freehand, Illustrator or CADD programs) are also available to users who have access to the software and have a need to produce computer-aided graphics with more sophistication. Choose the right tool for your job.

▲

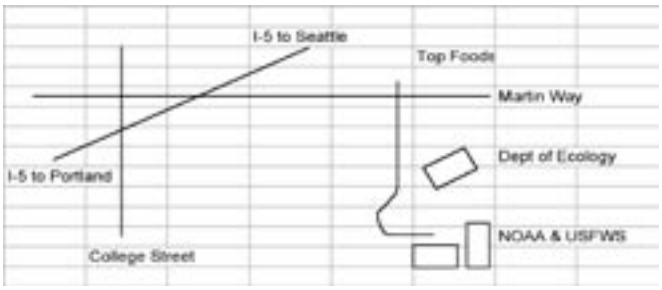

Figure 1 - Map to NOAA Fisheries and USFWS in Lacey.

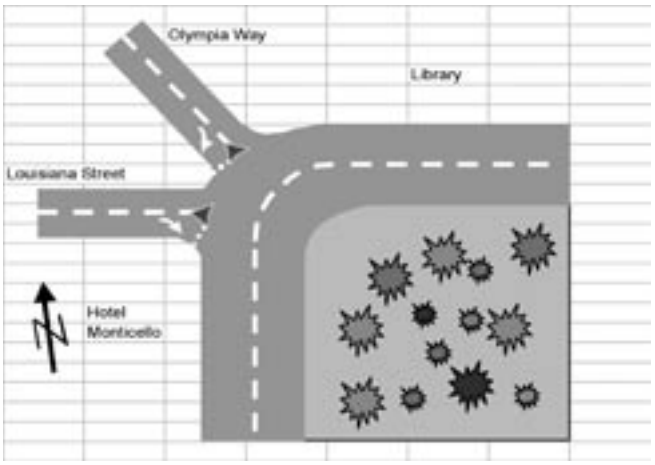

Figure 2 - Sketch used to show existing conditions and proposed features for a project in Longview.

Figure 3 - New bridge over an existing river.

Tack Coat

Reprinted from "TECH NOTES", a publication by the WSDOT Environmental & Engineering Program Materials Laboratory to share design and construction technology gained from projects or research performed.

The use of emulsified asphalts as a tack coat for hot mix asphalt (HMA) paving has predominately been ignored as to the importance it plays in the pavement structure. The lack of tack coat can lead to premature failure in the form of debonding, mat slippage, and potentially fatigue cracking, which leads to reduced pavement life.

Tack coats are diluted emulsified asphalt materials placed on an existing pavement surface prior to a hot-mix asphalt overlay. Tack coat needs to be applied to any adjacent surface (i.e. curbs, gutters, structures, or existing pavement). A quality tack coat provides the necessary bond between the underlying/adjacent layers and the new pavement surface. The bond ensures that the entire pavement structure will act together. Deficiencies such as debonding, mat slippage, and top-down cracking can occur with a poor bond between layers. Progression of these deficiencies advances into other distresses that can greatly reduce the life of the pavement surface. The fundamental aspects of tack coat success include surface preparation and application, along with the proper setup and function of the equipment.

According to WSDOT Standard Specification[i] 5-04.3(5)A, the entire surface of the pavement shall be thoroughly cleaned of dust, soil, pavement grindings, and other foreign matter (Image 1). A proper bond cannot be achieved if the surface is not thoroughly cleaned. The tack coat will bond to the existing surface to the overlay so the entire pavement structure can act as one. Unfortunately, even a uniform tack coat application is of no value if the surface is not prepared correctly.

Image 1 — Brooming roadway surface.

Surface preparation is the first step in applying a proper application of tack coat. The emulsion needs to be placed on a clean, dry surface. The bond is first created by the absorption of the emulsion into the existing surface, second by the emulsion curing and breaking, and third by placing the hot-mix layer over the broken emulsion. If the surface is not clean, the emulsion absorbs into the debris left on the roadway instead of the existing surface. When the paving equipment is allowed onto the tack coat, "pick up" can occur. Pick up is the term used to describe when the tires of the paving and delivery equipment pick up the tack coat. If the existing surface is not thoroughly cleaned, absorption into the surface does not occur (the excess fines on the roadway absorb the emulsion). In this case, the emulsion does not bond to the existing surface and when delivery or placement equipment is driven over the tack coat, the tack sticks to the equipment's tires instead of the roadway. Of course, tire pick up typically occurs in each of the wheelpaths, which is the most critical location for the new surface to bond to the existing surface (Images 2 and 3).

Image 2 — Delivery Vehicle Tracking.

Image 3 — Material transfer device tracking.

This problem happens more often with a milled surface because of the large amount of debris created during the milling process. Brooming the surface typically does not adequately remove the debris. A broom and vacuum system may be necessary to completely clean the roadway prior to the application of the tack coat.

Tracking of the tack coat can also cause a safety hazard. The delivery trucks track the tack onto other existing surfaces and create areas of reduced skid resistance.

Within Washington State, the use of CSS-1 (Cationic Slow Set), STE-1 (Standard Tack Emulsion), or CSS-1H is predominately used for tack coat applications. The difference between CSS-1 and CSS-1H is that the CSS-1H residue has a lower penetration value (i.e. a stiffer asphalt). This results in less penetration into the existing surface.

Various states have residual emulsion rates that vary from 0.03 to 0.15 gal/sq. yd. WSDOT Standard Specifications[i] call for 0.02 to 0.08 gal/sy of retained asphalt, which equates to an application rate of 0.05 to 0.11 gal/sq. yd. Application rates need to be adjusted according to the existing pavement condition, surface type, and dilution rate.

Recently, a technical paper from Flexible Pavements of Ohio[ii] has published application rates for various pavement types (Table 1). The residual rates vary from 0.03 to 0.08 gal/sq. yd. for different pavement types.

Image 4 — Application on oxidized asphalt.

Image 4 shows an oxidized asphalt surface with a residual asphalt amount of 0.04 gal/sy, which is at the low end of the recommended application rate.

Image 5 — Excessive tack (unbroken).

In contrast, Image 5 illustrates the application of too much tack. The residual application rate was 0.05 gal/sy but was applied four times, which equates to a residual application rate of 0.20 gal/sy. This much tack is not necessary and the cure time will be excessively long.

Table 1. Typical Application Rates[ii]

	Application Rate* (gallons/sy)		
Existing Pavement Condition	**Residual**	**Undiluted**	**Diluted (1:1)**
New Asphalt	.03 to .04	.05 to .07	.10 to .13
Oxidized Asphalt	.04 to .06	.07 to .10	.13 to .20
Milled Surface (asphalt)	.06 to .08	.10 to .13	.20 to .27
Milled Surface (PCC)	.06 to .08	.10 to .13	.20 to .27
Portland Cement Concrete	.04 to .06	.07 to .10	.13 to .20
Vertical Face	**	**	**

*Rates shown are for slow setting asphalt emulsions (SS1, SS1H) containing approximately 60% bituminous material.

**Longitudinal construction joints should be treated using a rate that will thoroughly coat the vertical face without running.

Besides the possibility of creating a slip plane, excessive tack can result in a much slower cure time. Allowing the tack to cure or "break" is another vital component in the life of a pavement. Paving over uncured tack can cause a slip plane. Typically, a slip plane is noticeable during rolling operations in the form of checking or microcracking. Flushing can also be caused by paving over unbroken tack. Migration of the tack into the overlay will cause an over-asphalted mix. A tack coat that has cured will turn from brown (Image 5, the surface is slick) to black (the surface becomes sticky).

Research from a recent report (Eighth International Conference on Asphalt Pavements[iii]) has shown that the strength of the wearing course increases as the time for the tack to break increases. For instance, a 24-hour cure time has a higher bonding capability than a one-hour cure time. Time and traffic constraints do not allow long cure times, but the time allowed for the curing of tack needs to be maximized.

The distributor equipment is essential to proper application. It must function properly to ensure the desired rate and uniformity. Distributors have to be capable of maintaining proper temperature, pressure, and spray bar height to apply the correct emulsion rate.

According to WSDOT Standard Specification[1] 5-02.3(3), the emulsion temperature for application can range from 70° to 140°F. Because CSS-1H and STE-1 are more viscous materials, they will probably require a higher temperature than CSS-1. Temperatures for CSS-1 are typically around 135°F but can vary depending on the manufacturer and dilution rate. The manufacturer should be able to recommend the best temperature for their emulsion. The emulsion needs to be kept at the proper temperature because it can cause problems within the tank and nozzles, or with the application rate.

The pressure, along with the speed of the truck, need to be properly adjusted according to the application rate, type of emulsion, and the type of spray bar nozzles. The opening of the spray bar nozzles, also called snivies, need to be the proper size to create the needed pressure. If too small of a nozzle opening is used (i.e. too much pressure), the result can be spray back or misting. The result is a surface that has a spider web coating of tack (Image 6).

Not only is nozzle selection important, but also the angle of the nozzle with respect to the spray bar axis. There should be a 15 to 30 degree angle to each of the nozzles and all nozzles should be set at the same angle to maximize overlap and minimize interference.

Image 6 — Small nozzle opening.

Spray bar height is also important to the application process. The height will depend on the speed of the truck, the snivy configuration, and the pressure used to apply the emulsion. The spray bar height will also have to be adjusted throughout the day depending on the amount of emulsion in the tank. Once the proper type of snivy and configuration are chosen for the type of emulsion to be used, the pressure, truck speed, and spray bar height can be determined according to the needed application rate. The proper choice for these factors should produce double or triple coverage, as shown in Image 7.

Image 8 shows the results of incorrect angle adjustment, spray bar height, and pressure.

Image 9 shows a correct tack coat application. There is a uniform coverage with no excess tack,

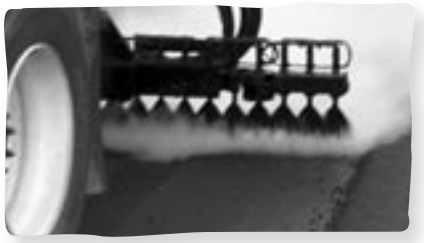

Image 7 — Proper overlap and spray bar height.

Image 8 — Uneven distribution.

Image 9 — Proper coverage on a milled surface.

which will allow the emulsion to cure in the minimum amount of time and perform well over the intended period of time.

The fundamental aspects of tack coat success include:

- Thoroughly clean roadway surface of foreign matter according to WSDOT Standard Specification[i] 5-04.3(5)A to increase bonding capabilities and lessen pick up.
- Ensure that all equipment functions properly and is setup correctly (i.e. pressure, nozzle size and angle, spray bar height, and emulsion temperature).
- Choose the proper application rate for the emulsion being used and existing surface conditions.
- Allow the tack to break prior to paving to ensure the best possible bond between the layers.

The proper preparation of the existing surface and tack coat application will lead to longer performance of HMA overlays. ▲

For more information contact: Jim Weston, (360) 709-5496, e-mail: westonj@wsdot.wa.gov

[i] Washington State Standard Specifications for Road, Bridge and Municipal Construction 2002.
[ii] Flexible Pavements of Ohio, Technical Bulletin: Proper Tack Coat Application (21May01)
[iii] Hachiya, Y; Sato, K (1997) Effect of Tack Coat on Binding Characteristics at Interface Between Asphalt Concrete Layers.

Driving Modern Roundabouts Receives National Award

By Dave Sorensen, Traffic Technology Engineer, WST2 Center

At the 24th Annual Telly Awards, the video, *Driving Modern Roundabouts*, won the bronze award in the Non-Broadcast Film/Video & TV Programs in Safety category. The video was a partnership between the Cities of Lacey and Olympia and the WST2 Center. The video production team includes Terry Ness, Steve Lee, Dave Sorensen, and Brian Walsh from WSDOT; Scott Spence from City of Lacey; and Jay Burney from City of Olympia.

The Telly Awards competition was founded in 1980 to showcase and give recognition to outstanding non-network and cable commercials. The competition was expanded several years ago to include film and video productions. Over the past 23 years, the Telly Awards has become a well-known, highly respected national competition. Over 10,000 entries are received each year. Past winners and finalists, representing all 50 states, as well as several countries, come from a large cross-section of agencies, production companies, television stations, cable operations, and video departments.

Congratulations to the "Driving Modern Roundabouts" video production team!

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WSDOT Tackles Urban Roadway Design Considerations

By Brian Hasselbach, WSDOT Design Office

Washington State's population is growing at a rate that is placing ever-increasing demands upon our transportation system. In particular, urban roadways are suffering from significant additional burdens. Both state and local engineers and planners are challenged by the need to reconcile multiple, sometimes conflicting, expectations for urban roadways. Much of the challenge involves balancing safety, mobility, and capacity needs with desires for aesthetic design features and incorporation of community-based values.

The WSDOT HQ Design Office has initiated a number of efforts in the past couple of years to address this need. The efforts consist of a combination of new research endeavors, communication opportunities, and the development of new guidance and tools. The following sections briefly outline these efforts.

Urban Roadways – *Design Manual* Supplement

The WSDOT HQ Design Office has recently drafted a *Design Manual* supplement, which provides modified design criteria for roadways within urban areas. In the urban environment, development and limited space often put constraints on a designer's ability to meet the full design level as outlined in the *Design Manual*.

The draft supplement attempts to bring the full design level into better alignment with what is working in the field, incorporating the philosophy and reality of what occurs in the urban setting with the intent of current guidance. The supplement also addresses topics such as raised medians, which are currently not addressed or are minimally addressed in the *Design Manual*. The supplement is currently in review and is planned for distribution during the summer of 2003.

Safety & Aesthetics Program – Interdisciplinary Group (IDG)

In June 2001, the WSDOT HQ Design Office launched a new effort to identify and tackle urban design issues. As part of this effort, the Design Office created an interdisciplinary group (IDG) of professionals from cities, counties, the Federal Highway Administration, Association of Washington Cities, regional planning councils, the County Road Administration Board (CRAB), the Department of Community, Trade, and Economic Development (CTED), and various disciplines and offices within WSDOT including Design, Planning, Traffic, Project Development, Environmental Affairs, Local Programs, Tribal Liaison, and Landscape Design.

The IDG is tasked with identifying urban design issues and articulating priorities, potential issues, and work elements. The group meets on a quarterly basis and serves as an invaluable tool for providing two-way communication between the Department and local agencies and in identifying sub-committees to address identified issues.

Safety & Aesthetics in the Urban Environment – Companion Document

Recognizing that the *Design Manual* has traditionally focused on freeway, rural, and high-speed arterial highway-type designs, the IDG has initiated development of a companion document to the *Design Manual*. The document will provide conceptual guidance for consideration of specific highway design issues unique to the urban environment.

The content of the document will not be focused on design guidance and criteria but on a number of issues associated with urban highway designs. It will discuss the trade-offs associated with each unique consideration. In the urban environment, there are a variety of competing expectations. It is the goal of this document to inspire excellence in design and prompt users to consider how best to optimize competing needs and limited resources. The document is currently under development and is planned for distribution by the fall of 2003 or winter of 2004.

In-Service Evaluation of Urban Median Design Concepts

WSDOT HQ Design is currently working with local agencies along SR 99 to conduct an in-service evaluation of new urban arterial median designs. This effort allows for real world testing of the safety and effectiveness of tree-planted medians. The effort is being conducted in coordination

with WSDOT Northwest Region Traffic and Design, the University of Washington TRAC (Washington State Transportation Center), and participating cities.

Each evaluation consists of a three-year (minimum) assessment of how agencies can use a tree-planted median as an option to preserve roadway safety, while promoting an aesthetic treatment. This effort strives to develop new urban median design solutions that preserve or enhance safety and capacity needs, while meeting environmental desires and community streetscape goals.

As reports of findings are generated, they will be made available on the Safety & Aesthetics web page noted below and design solutions will be incorporated, as appropriate, into the *Design Manual*.

Aesthetic Median Treatment Brochures

The IDG identified the need to develop a series of informational brochures to describe and communicate available options for aesthetic urban design features. A sub-committee of the IDG has developed a brochure for median and roadside design features, which is currently available on-line at the Safety & Aesthetics web page noted below. Work is continuing on other brochures, which will also be made available as they are developed.

Design Manual Supplements and Instructional Letters – New Guidance and Tools

- **Design Clear Zone, Design Manual Supplement**
  Design clear zone has been identified by the IDG as a high priority. A sub-committee of the IDG initiated an effort to review AASHTO guidelines and WSDOT policies regarding design clear zone, identify any differences in interpretations, and clarify design clear zone requirements. As a result of their findings, the sub-committee developed a series of recommended changes to the *Design Manual* in the form of a supplement. The intent of the supplement is to allow local flexibility and guidance when determining appropriate design clear zone requirements. The supplement was approved and issued with an effective date of November 1, 2002.

- **Instructional Letter 4053.00, Jurisdiction Over State Highways Within Cities**
  The design of managed access highways located within city and town limits, has been a contentious issue between cities and WSDOT, sparking debates over who has responsibility for the design of roadside elements outside of the curb. As a result of this uncertainty, a task group was formed to clarify the design responsibilities between cities/towns and WSDOT regarding roadside treatments.

The group began their clarification effort by developing a summary of applicable WACs related to urban roadway design. From the summary of applicable WACs, the group developed recommendations to clarify jurisdictional roles. Those recommendations were presented to and received agreement from the WSDOT Executives' Team. An Instructional Letter (IL), which outlines jurisdictional roles and responsibilities, was subsequently prepared, approved, and issued with an effective date of January 22, 2003.

Urban Funding Issues Group

The Urban Funding Issues Group was convened to determine the standard levels of WSDOT funding participation for roadside elements within a proposed project. The Group has been tasked with developing a matrix which will outline the eligibility of common roadside elements by funding program and serve as a communication tool for the Department. For those elements eligible for funding, the matrix will provide the existing standard, as defined by WSDOT, for that element. If approved, the matrix will be a useful tool for project partners in determining which elements are eligible for Department funding and to what level Department participation can occur.

A draft of the matrix is currently undergoing review. The products from the Urban Funding Issues Group will be presented as recommendations to the Department's Executive Management team for approval. If approved, the matrix will be incorporated into existing WSDOT publications.

Additional information on the WSDOT Design Office's Safety & Aesthetics program, as well as any of the above referenced efforts, can be found at http://www.wsdot.wa.gov/eesc/design/Urban/Safety,Aesthetics,&ContextSensitiveDesign.htm.

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For more information on WSDOT's Safety, Aesthetics and Context Sensitive Design effort and its products, contact Brian Hasselbach, WSDOT Design Office, at 360-705-7255 or hasselb@wsdot.wa.gov. For more information on the Urban Roadways Design Manual Supplement, contact Ted Focke, WSDOT Design Office, at 360-705-7270 or focket@wsdot.wa.gov.

Conflict of Interest?

By Al King, P.E., former Operations Engineer, WSDOT Highways & Local Programs

Conflict of interest is a question that every consultant must face from time to time. As the delegated stewards of federal funds used by local agencies, WSDOT Highways & Local Programs (H&LP) generally assumes that consultants are aware of the state and federal laws governing conflicts of interest. H&LP is also specifically tasked with enforcing conflict of interest provisions in the Code of Federal Regulations (CFR).

H&LP hopes never to have to enforce those provisions, because the process becomes difficult, time-consuming, extremely stressful for all involved, and disadvantageous for the firm facing such issues. Fortunately, consultants are generally very responsible and responsive to such issues.

As a reminder of consultants' responsibilities, I have extracted a couple of pieces from state law and federal regulation. H&LP recommends that all consultants review these sections from time to time in their entirety to assure that both they and their clients are being properly served and that no appearance of impropriety occurs.

Washington State law in RCW 18.43.105 defines **"Misconduct or malpractice in the practice of engineering"**, in part, as:

(7) Conflict of interest — Having a financial interest in bidding for or performance of a contract to supply labor or materials for or to construct a project for which employed or retained as an engineer except with the consent of the client or employer after disclosure of such facts; or allowing an interest in any business to affect a decision regarding engineering work for which retained, employed, or called upon to perform.

Washington Administrative Code, in clarifying responsibilities of Registered Professional Engineers, states in WAC 196-27A-020:

(i) Registrants shall avoid conflicts of interest, or the appearance of a conflict of interest, with their employers or clients. Registrants must promptly inform their employers or clients of any business association, interest, or circumstances that could influence their judgment or the quality of their services or would give the appearance that an existing business association, interest, or circumstances could result in influencing their judgment or the quality of their services.

Similarly, federal regulation 23 CFR 1, **Sec. 1.33 Conflicts of interest**, in part states:

No engineer, attorney, appraiser, inspector or other person performing services for a State or a governmental instrumentality in connection with a project shall have, directly or indirectly, a financial or other personal interest, other than his employment or retention by a State or other governmental instrumentality, in any contract or subcontract in connection with such project.

The federal regulation goes on to state:

It shall be the responsibility of the State to enforce the requirements of this section.

WSDOT works with approximately 400 public agencies across the state. The most common concern is when a consulting engineer, who is acting as the engineer of record or the City Engineer for a public agency, also works for the same firm that is providing project-consulting services for that same agency.

Clearly, the simplest way to avoid any hint of conflict is for the firm not to provide consulting services and City Engineer services at the same time for a particular agency. The issue must also be considered in light of federal involvement in the project.

If projects only include local or state funding, with no federal influence, there may be some flexibility; although, the law is not precise. Given that circumstance and that a firm wishes to pursue additional work above that of providing City Engineer services, the firm should explain in detail to the public agency how the firm's additional role would not influence the City Engineer's judgment or the quality of his/her services. Without the aid of such a disclosure, the public agency cannot properly determine whether the additional services would create a 'conflict of interest' as defined above. Moreover, without providing such information, the firm would certainly appear to be in violation of the rules of professional conduct.

When there is federal influence in a project, such as the case with federal funding, the interpretation of the CFR by FHWA is very clear: 1.33 prohibits the consultant from performing work on a specific project for a City in which the same consultant is acting as City Engineer. That can be said in a couple of ways. If a city hires a person from a consulting firm to act as that agency's engineer, then that person may not par-

ticipate in any work on any federal aid project which that agency has in progress at any stage of the project. Or if a city hires a consultant firm to act as that agency's engineer, then that firm may not participate in any work on any federal aid project which that agency has in progress at any stage of the project.

A common practice is that a person from a firm is designated as the city engineer. The conflict can be avoided by barring that person from any contact, direct or **indirect**, with the project. The person may continue to act as the City Engineer on other issues and projects as long as there is no indirect or direct relationship to the ongoing federal aid project. In most cases that is not a workable solution. My recommendation, shared by FHWA and the Assistant Attorney General, is that when a consulting firm, either through a single person or as a firm, provides services to a city as their engineer of record, the firm should not expect to participate as a design or other services firm on any federal aid project of that city.

H&LP is confident that consultants will continue to police their own actions appropriately and the need for "the state" (H&LP) to step in will not occur on federal aid projects. If you have a question about these issues, contact the H&LP Operations Office at 360-705-7375. The Operations Office will try to provide some basic guidance, but cannot provide legal advice to either consultants or the local agencies. It is strongly recommend that you work with your legal counsel on the specifics of a particular circumstance.

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Swords into Plowshares

Soil Nail Launcher

British Military Launcher Now Available for Civilian Applications

By Bob Barrett, reprinted from MOinfo, Winter 2002, vol. 1, number 2

The British military developed a compressed air launcher to deploy nerve gas. This device could send quart-size nerve gas canisters 7 miles. When nerve gas warfare went out of style, a civilian company acquired the launcher and modified it to launch steel bars. It will shoot a 20 foot long bar fully into the ground.

The U. S. Forest Service (USFS) brought this device to the United States for a demonstration project. State DOT personnel from Colorado, Washington and Oregon participated in the demonstration and evaluation. It was concluded that the Soil Nail Launcher could quickly and economically repair landslides, wall failures, abutment and wing wall failures and provide emergency scour protection.

The Soil Nail Launcher accelerates a 1.5-inch steel bar up to 220 miles per hour. These massive bars are 20 feet or more in length. As these high-speed steel projectiles enter the earth, it appears a shock wave is created, causing the soil to "jump away", allowing the bar to pass without significant abrasion. The soil then collapses onto the bar, creating a powerful bond. Tests show this bond to be much greater than

with percussion-driven nails. Pull-out tests indicate bond strength can be as high as 40 PSI. In tests with galvanized bars launched into gravel stockpiles, the retrieved bars showed little loss of galvanization.

Launched nails can be solid bar, threaded bar, or hollow bar. The hollow bars can act as horizontal drains. The bars can be plain, galvanized or epoxy coated. One of the major advantages to this method is that launched soil nails are functional immediately.

An excavation that could take a week or more with traditional nails can be stabilized in a day or less with launched soil nails. Construction projects can be completed well ahead of schedule where nailing is on the critical path.

Launched nails can be used to stabilize fill and cut slope failures on highways and railroads as well as vertical excavations for construction projects. Pavement and guardrail and trackage can be left undisturbed. Railroad slopes and failing walls can be repaired without interference with train traffic and only one lane closure is needed on highways.

Nails can be inserted horizontally to create tiebacks so that whalers can be added to stabilize failing piling walls. Failing bin, crib and wing walls can be saved with launched nails. These nails can anchor erosion mats on slopes and they can support steel mesh and shotcrete on vertical cuts. Launched nails are ideal for temporary applications and may be considered permanent in most environments.

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For more information visit www.soilnaillauncher.com or contact Bob Barrett, 549 South Broadway, Grand Junction, Colorado 81503, (970) 270-4624

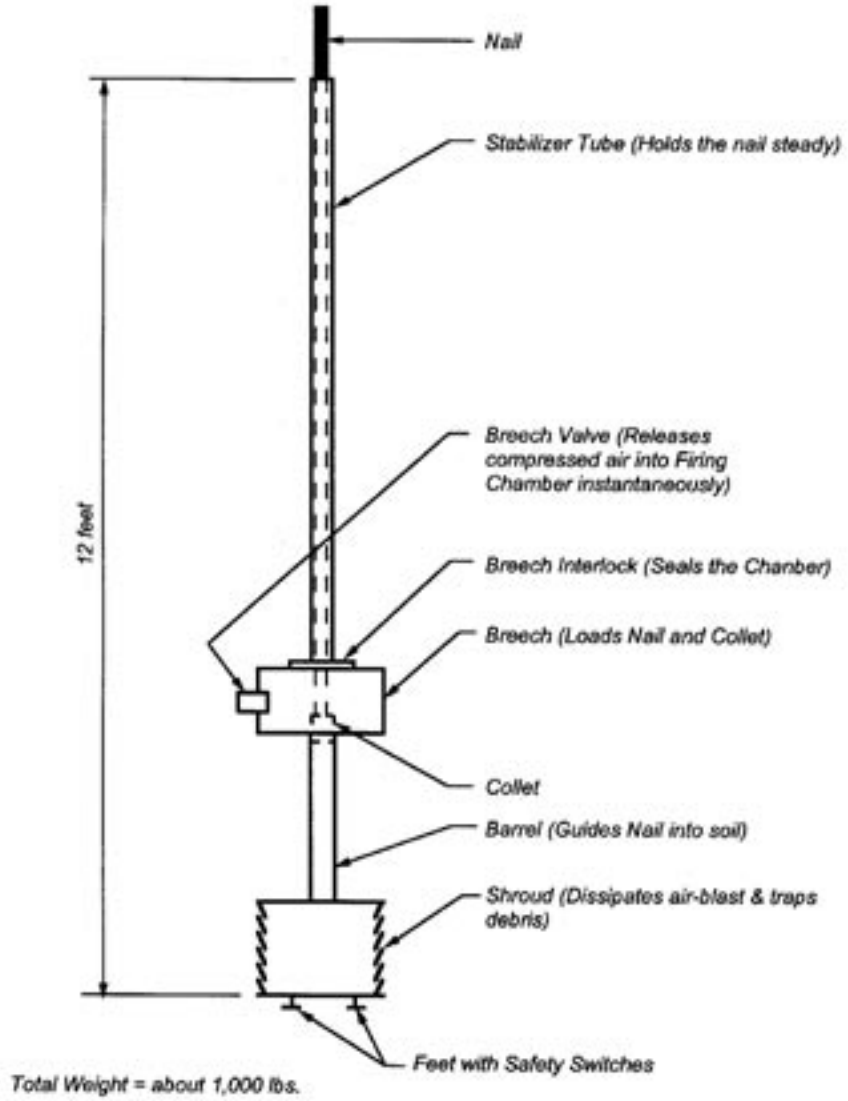
Additional Sources:

Application Guide for Launched Nails-Volume 1, FHWA-FPL-93-003, July 1994

Project Report for Launched soil Nails-Volume 2, FHWA-FPL-93-004, July 1994

SOIL NAIL LAUNCHER

Source: Application Guide for Launched Nails-Volume 1, FHWA-FPL-93-003, July 1994



SCHEMATIC OF SOIL NAIL LAUNCHER

Source: Application Guide for Launched Nails-Volume 1, FHWA-FPL-93-003, July 1994

Evaluation of "Targeted Pedestrian Enforcement"

Reprinted from Washington Traffic Safety Commission, Traffic Research & Data Center, January 2003. Written by John M. Moffat, Director, and Philip M. Salzberg, PhD, Research Director, Washington Traffic Safety Commission

INTRODUCTION

The safety of pedestrians on public roads depends primarily on three factors:

- Environmental factors including the design of crosswalks.
- Pedestrian behavior and their awareness of approaching vehicles.
- The behavior of drivers, especially compliance with traffic laws intended to protect pedestrians from vehicle collisions.

Clearly, one of the most critical factors is driver compliance with pedestrian safety laws. Washington law regulating driver behavior at crosswalks requires that approaching vehicles must slow or stop when a pedestrian is in their half of the roadway (RCW 46.61.235). On a multi-lane road the requirement to stop applies to vehicles when a pedestrian is within one lane of their half of the roadway. Vehicles may proceed once the pedestrian is beyond one lane of their half of the roadway.

Driver compliance with pedestrian crosswalk laws can be influenced by public education and police enforcement. Many drivers are unaware of the requirements specified in the crosswalk law. Other drivers may see pedestrians only as obstacles in the roadway that require a vehicle maneuver in order to proceed. Public information and education that explains the crosswalk law and the penalties for violations may be beneficial. However, many drivers may perceive a low likelihood of police enforcement, which would obviate their motivation to comply with the law. In most jurisdictions the amount of crosswalk enforcement, in fact, is very low.

One method of increasing driver compliance with crosswalk laws is the technique of targeted pedestrian enforcement (TPE). This technique involves deploying a pedestrian decoy, a cadre of police traffic enforcement officers (typically motorcycle officers), and an observer who is in radio contact with the pedestrian and the enforcement personnel. A roadway crosswalk site is selected where the pedestrian decoy will attempt to cross when a vehicle passes a marked point on the road that is a measured distance from the crosswalk. The enforcement personnel are positioned a block or two ahead and are hidden from the view of drivers approaching the target crosswalk. Drivers that fail to stop or slow for the pedestrian are then pulled over by the enforcement officers and either cited or given a warning. The observer radios a description of the errant vehicle to the enforcement officers. TPE is typically conducted in conjunction with public information media messages that inform drivers of the enforcement effort.

The purpose of this study was to evaluate the effectiveness of TPE in increasing the rate of driver compliance with the crosswalk law.

METHOD

The Setting for the Study: Bellingham and Olympia Washington

The targeted enforcement activities were conducted in Bellingham, Washington. We gratefully acknowledge the participation of the Bellingham Police Department in this study, and in particular, the assistance and enthusiastic support of Sergeant Shawn Aiumu in coordinating the enforcement as well as the observation and data collection activities.

Bellingham is a medium size city (population ~ 70,000) located on the Interstate 5 corridor 90 miles north of Seattle and about 50 miles south of the Canadian border. The economy of the city is based primarily on retail trade, services, and manufacturing. The culture and economy of the city are strongly influenced by Western Washington University.

Olympia (population ~ 40,000) was the comparison city for the study. The three-city metropolitan area of Olympia, Tumwater, and Lacey has a population of about 80,000, roughly equivalent to that of Bellingham. The city is located at the southern tip of Puget Sound on the I-5 corridor about 60 miles south of Seattle. Olympia is the State Capital, and the local economy is primarily driven by state government, with retail trade and services also being important aspects. Similar to Bellingham, the city is home to a state university,

The Evergreen State College, which has had a major influence on the city's culture and economy.

The Study Sites

There were six sites in Bellingham-three enforcement sites and three comparison sites. All sites were posted for 25 MPH speed limits and near to the downtown area of the city. Four of the sites were 3-lane one-way streets and two were 2-way streets (one lane in each direction) with a center left-turn lane. An equal number of both types of streets were assigned to the enforcement and comparison conditions. The sites were selected by the Bellingham Police Department because they posed a higher risk of pedestrian-vehicle collisions. At each site there was a marked crosswalk with no traffic control signs or signals.

Three comparison sites were selected in Olympia that appeared to be similar to the Bellingham sites and were near the downtown area. The Olympia sites included two one-way streets and one 2-way/center left-turn street. Each had a 25 MPH speed limit, a marked crosswalk, and no traffic control signs or signals.

All of the sites in both cities were set up with a measured distance from the crosswalk of approximately 160 feet where a traffic cone was placed a few feet from the curb or a fixed object such a light post was noted. This distance was selected to give adequate time for a vehicle to stop at the crosswalk when traveling at a 35 MPH speed on wet pavement and allowed for a two second driver reaction time.

Design of the Study: Before-During-After with Multiple Comparisons

The study was conducted over a three-week period during the weeks beginning October 28, November 4, and November 11, 2002. The study began on the Monday following the change from daylight savings time to standard time. Observations were made on weekdays during two-hour periods in the morning (7-9 AM) or afternoon (3-5 PM).

Observations of vehicle responses to the pedestrian decoy were conducted in the first week at all study sites to establish baseline rates of driver compliance.

Enforcement activities were conducted in the second week at three of the Bellingham sites, and observations of driver compliance were conducted at all of the study sites. Public service media announcements of the impending TPE activities in Bellingham began during the weekend following the baseline week and continued into the week of enforcement. These media messages were carried on local TV, radio, and newspapers.

Follow-up observations at all sites were done in the week following enforcement activities. The observations at each site were made on the same day of the week and same time of day over the three-week study period.

The Olympia sites provided an assessment of driver compliance in a city where no special enforcement or media activities had been conducted. The comparison sites in Bellingham provided an assessment of the effect of the media announcements in the absence of specific enforcement activities.

The design of the study, then, consisted of three time periods (before, during, and after the enforcement activities) by three types of sites (TPE sites, non-TPE sites in the same city that received the media messages, and comparison sites in a different city where no enforcement or media activities occurred).

Procedures

Observations were done on weekdays in the morning (7-9 AM) or afternoon (3-5 PM). Because fall weather in Washington is unpredictable, the observer-pedestrian teams were instructed that in the event of rain or extreme cold to limit data collection to 200 observations or the scheduled two-hour time period, whichever came first.

Observations were initiated when a vehicle passed the cone or object that was located about 160 feet from the crosswalk. The pedestrian would then step onto the street one or two paces from the curb and look at the approaching vehicle. Eye contact with the driver was minimized. If the vehicle slowed or stopped, the pedestrian would proceed across the street. The pedestrian was instructed to be cautious of other vehicles in adjacent lanes and not to proceed unless the other vehicles also were slowing.

The observer recorded on a data sheet whether or not the vehicle stopped or slowed for the pedestrian. "Stopping" was defined as follows: a vehicle that stopped or slowed for the pedestrian, but then continued before the pedestrian had cleared the appropriate number of adjacent lanes was counted as "not stopping". When observations were initiated as a group of vehicles approached, each vehicle was counted on the data sheet as to whether it had complied with the crosswalk law.

The Pedestrian Decoy

The pedestrian decoys in both cities were of similar appearance; male about six feet tall, weighing about 170-180 pounds, dressed in casual clothing and neutral colors. The pedestrian in Bellingham was a commissioned police officer. Two different persons served as pedestrians in Olympia; one was a retired police officer and the other a Washington Traffic Safety Commission (WTSC) staff person. All received training for the study on the crosswalk procedures and safety precautions.

RESULTS

Driver compliance with the cross-

Table 1.
Percent of Drivers Stopping or Yielding for the Pedestrian

City	Type of Site	Study Phase	N of Drivers Yield for Ped	N of Sites / N of Drivers	Percent Yield for Ped
Bellingham	Control	Before	458	3 1134	40.4%
		During	489	3 821	59.6%
		After	416	3 635	65.5%
		Total	1363	9 2590	52.6%
	Enforcement	Before	512	3 1038	49.3%
		During	567	3 899	63.1%
		After	433	3 582	74.4%
		Total	1512	9 2519	60.0%
Olympia	Control	Before	162	3 614	26.4%
		During	187	3 590	31.7%
		After	110	3 557	19.7%
		Total	459	9 1761	26.1%

walk law at the Bellingham TPE sites averaged 49.3% during the baseline week and increased to 63.1% when the enforcement activities were conducted. During the follow-up week, compliance remained high at 74.4%. These data are shown in Table 1. There were 236 traffic citations issued for crosswalk violations during the week of enforcement.

Compliance rates at the comparison sites in Bellingham were somewhat lower but showed the same pattern of improvement increasing from 40.4% to 59.6% to 65.5% over the three weeks of the study.

In contrast, driver compliance at the Olympia comparison sites during the baseline week was substantially lower than the Bellingham baseline rates and remained low during the second week as well as during the follow-up week. Compliance in Olympia averaged 26.1% over the three weeks of the study.

The data were analyzed for potential confounding factors such as inclement weather, poor visibility, time of day, day of week, and road configuration (one-way vs. two-way). None of these factors could account for either the improvements in driver compliance found at the Bellingham sites or for the differences found between the Bellingham and Olympia sites.

DISCUSSION

Both the TPE and comparison sites in Bellingham showed increases in driver compliance of 25 percentage points from baseline to follow-up, which represents more than a 50% improvement. The fact that there was a comparable increase in compliance at the non-enforcement sites suggests that Bellingham drivers had received the media messages about the TPE program and adjusted their driving behavior accordingly.

Driver compliance did not change at the comparison sites in the city of Olympia where no enforcement or media activities occurred, and in fact, decreased by six percentage points. This finding suggests that the improvement in driver compliance found in Bellingham can be legitimately attributed to the TPE program and not to some other extraneous factor that influenced driver behavior throughout the State.

The data also show that the increased compliance in Bellingham continued during the follow-up week, suggesting at least a short-term carry-over effect from the week of the TPE activities. The extent to which this improvement might continue into the future is unknown. However, it is likely that compliance would revert back to baseline levels in the absence of at least some continued enforcement and public awareness. We recommend that the Bellingham Police Department continue to conduct occasional TPE activities accompanied with media messages.

It should be also noted that the effect of TPE was found in a city with a relatively high baseline compliance rate. An important question is whether TPE would also be effective in a jurisdiction where the baseline rate was low.

In conclusion, the findings of this study demonstrate that the technique of targeted pedestrian enforcement can be an effective tool for improving the rate of driver compliance with the pedestrian crosswalk law.

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Dan Haupt's Cone Setting Cage

By Dave Sorensen, WST2 Traffic Technology Engineer

We all know traffic control operations is not a job for the faint of heart. This is serious business and takes careful planning and coordination among crews out on Washington's roadways. Dan Haupt, Transportation Equipment Fund (TEF) Mechanic working out of the WSDOT Colfax Maintenance Office, had an idea to improve traffic control operations while saving time, money, and providing a faster, safer way to set out and pick up traffic cones. The cone-setting cage Dan fabricated may not have been a new idea; others use similar equipment. However, Dan needed a cone-setting cage that would fit the trailer-hitch receivers on all the pickup trucks in their fleet. Taillights were also added to the cage for improved visibility and safety. The lights are wired to plug into the trailer light receptacle on any of their trucks.

This "Better Mousetrap" was built in-house with new and scrap materials at a cost of about $200. The design is simple and effective. A one-inch by two-inch square tubing lays the framework, which was covered with steel diamond mesh on the front, floor, and rear of the cage. A hitch receiver "slug" was welded on the back of the unit. A scrap plastic pick-up bed liner was bolted to the diamond mesh on the backside of the unit. The liner is used to shield workers from mud and debris from the trucks rear tires.

With Dan's innovations, cones are now easily set and retrieved more efficiently. Setting up and breaking down traffic control quickly benefits road crews and motorist alike.

Our hats off to Dan for taking a good concept and making some great improvements!

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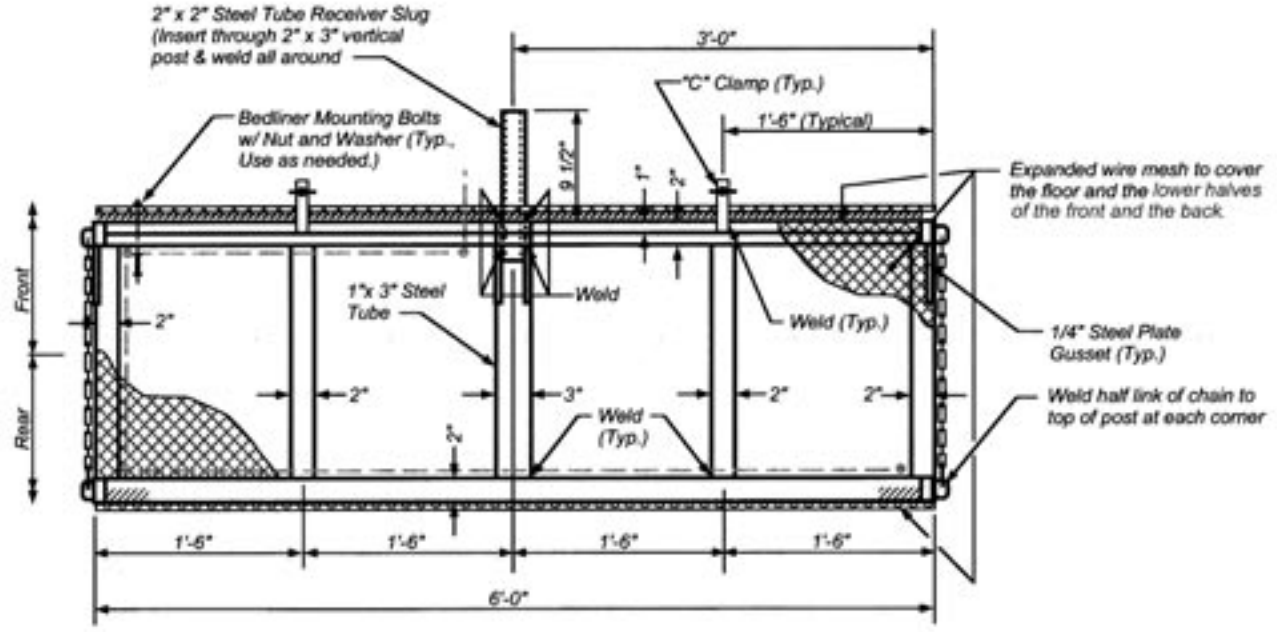
Dan Haupt welcomes questions about the cone setting cage and can be reached at (509) 397-3051 or email at HauptC@wsdot.wa.gov.

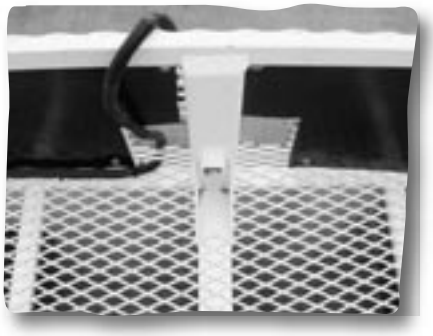
Top Photo: Dan Haupt stands next to his Cone Setting Cage.

Left Photo: Side view with safety chains in place.



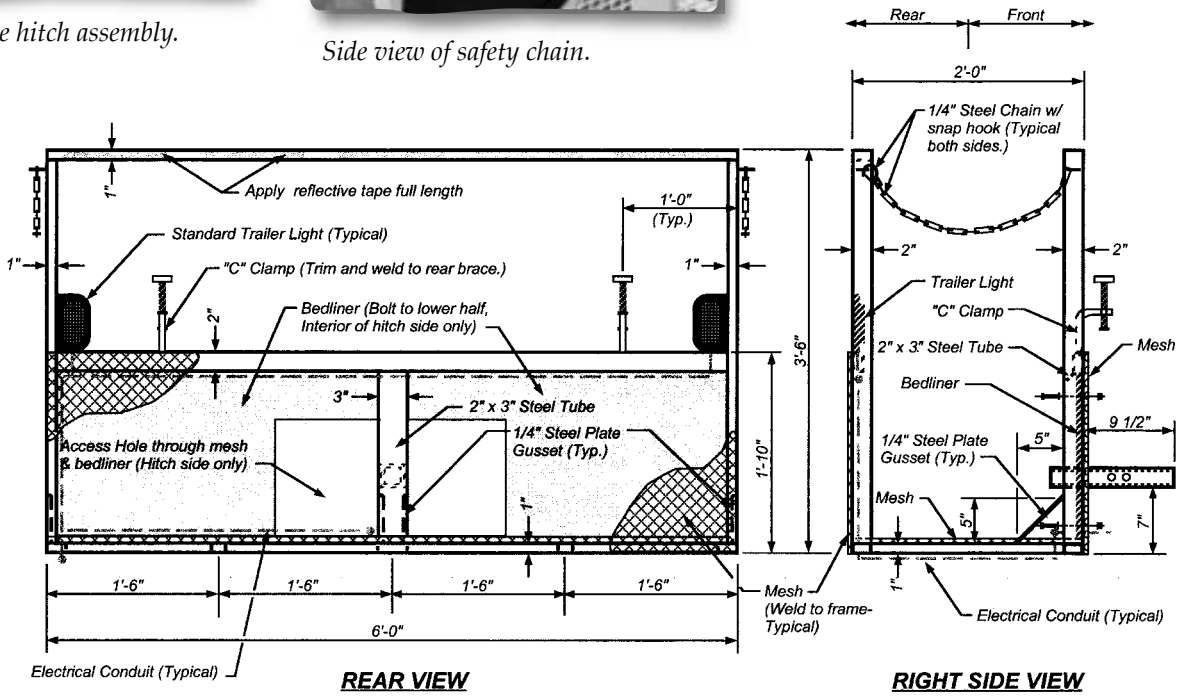
TOP VIEW

All members are 1"x 2" Steel Tubing (except as noted) welded together .



Backside of the hitch assembly.

Side view of safety chain.



REAR VIEW **RIGHT SIDE VIEW**

All members are 1"x 2" Steel Tubing (except as noted) welded together .

Gordon Olsen & Bradley Bloodgood's Saw Trailer

By Bob Brooks, WST2 Pavement Technology Engineer

About two years ago, Gordon Olson, City of Tacoma Public Works Concrete Supervisor, wondered if there wasn't a better method for conducting their necessary sawing operations on city streets, curbs, and sidewalks when repairs were needed. He approached Bradley Bloodgood, a former shipbuilder and current fabricator and welder at the City's Fleet Operations Center, to see what could be done. Bradley took an existing saw trailer used by the City and completely redesigned it, adding several innovative improvements and greatly expanding the functionality of the piece of equipment.

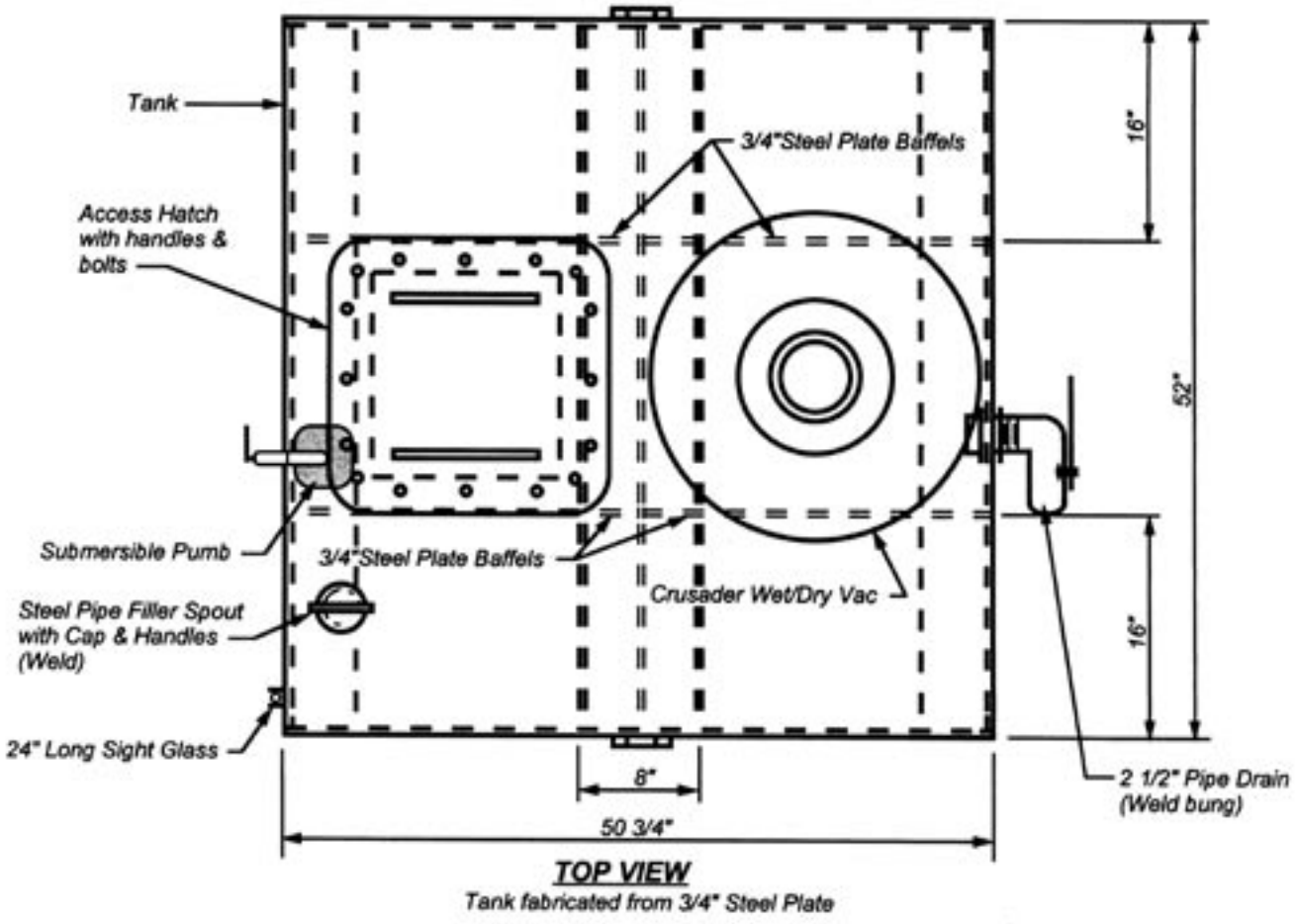
Rear view.

Side view.

The resulting concrete saw trailer is a dedicated piece of equipment used for making cuts in PCC concrete streets, sidewalks, and curbs. It was designed and built in response to environmental concerns and the Endangered Species Act (ESA). This new trailer proved to be so effective at mitigating the environmental impacts of sawing operations that Bradley took the 15-year old original saw trailer, with its limited functionality, and rebuilt it to incorporate many of the improvements designed into the new trailer. The older trailer, with its smaller capacity, is now dedicated to sawing operations in asphalt concrete pavement.

The platform used for the new concrete saw trailer is a 12-foot double axle trailer purchased for $2,000. The City spent an additional $2,640 for parts to complete the trailer. The main component of the trailer is a 600-gallon double compartment water tank. The tank is split equally, 300-gallons each side, between a fresh water supply and a capture compartment used to hold the spent water from the sawing operation. The tank capacity was designed so that the trailer, when fully loaded, would not exceed the maximum legal weight limit.

Each compartment in the tank contains two baffles used to keep the load stable when traveling. The fresh water compartment is fitted with an access panel large enough to allow access to an electric submersible pump that feeds a 30-foot hose stored on a reel on the trailer. The hose is attached to the self-powered concrete saw to provide cooling, lubrication, and to carry away concrete waste material from the sawing operation. The 300-gallon capacity provides enough water for a half-day of sawing before the tank needs to be refilled. The tank is fitted with a sight glass that shows



Top of tank.

the amount of water remaining in the tank.

The other half of the tank is devoted to storing wastewater. It is fitted with a Crusader wet/dry vacuum system connected to a hose with an adjustable nozzle. The nozzle is directed in such a way that it picks up wastewater from the sawing operation. Bradley estimates that the recovery system is 90% efficient at capturing the water used, picking up 9 gallons of every 10 gallons used. The waste compartment has a discharge valve located on the side of the tank that allows for quick discharge of the wastewater into the water collection system at the Operations Center.

Additional innovations built into the trailer include an electric winch located on the front of the trailer that passes a cable through a channel built into the bottom of the water tank. The winch is connected to the saw and is used to help secure the saw in place on the trailer bed; it can also be used to pull the saw up onto the trailer in the event the self-powered saw is inoperable. The back of the trailer is equipped with a pullout ramp used for loading and unloading the saw from the trailer. The trailer also has a built-in toolbox used for storing hoses and other miscellaneous items that may be needed on the job.

The concrete saw trailer is very efficient at recovering the wastewa-

ter used during sawing operations and keeping it out of the drainage systems found around the city of Tacoma. This reduces the environmental impact of this operation, helps protect the water quality and wildlife habitat of the area, and demonstrates to the citizens of Tacoma the good environmental stewardship practiced by the city's Public Works Department.

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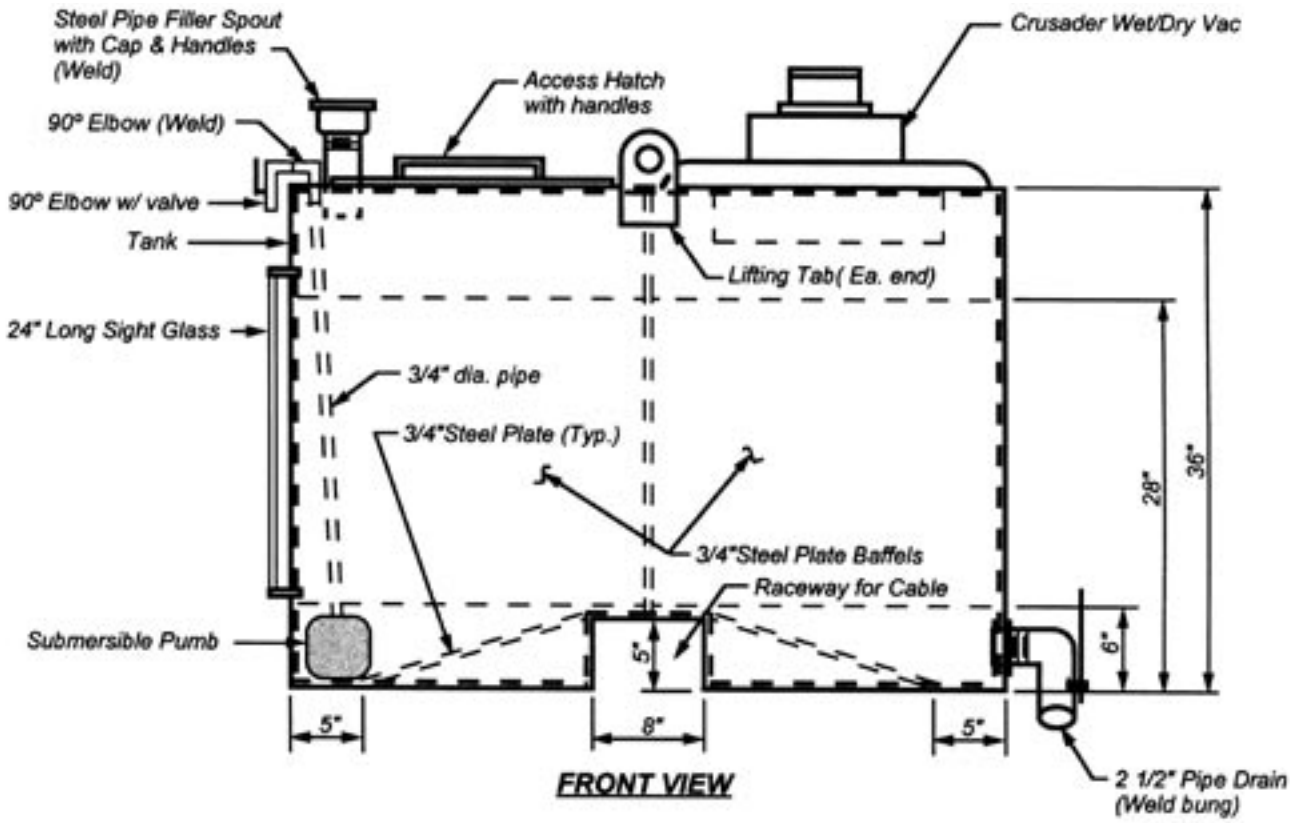
Front view.

Winch



Hose reel for water supply.

Hook and cable from wench for pulling the unit into place.

Saw blade rests in a notch in the deck.

Test Your Paving Skills Online

Reprinted from Transportation Northwest Regional Center Newsletter, May 2003

George Turkiyyah and Joe Mahoney at the University of Washington are the Principal Investigators for a research project which developed prototype 3D interactive computer-training environments for a major element of transportation infrastructure-hotmix asphalt paving. The research is entitled "Transportation Infrastructure Design and Construction-Virtual Training Tools." The virtual "tools" include elements of hotmix design and construction equipment and methods for building and maintaining asphalt pavements. The software is targeted toward university students and practitioners with the goal of providing a direct and realistic experience for learning about and interacting with both laboratory and construction equipment. This project builds on and complements projects supported by WSDOT [Washington State Department of Transportation] and NAPA [National Asphalt Pavement Association], and it reflects changes that have come about in hotmix design and construction in the U.S. due to the development and implementation of the Superpave mix design system.

Training of students, technicians, and novice engineers is expensive for most universities and contractors. The proposed tools will reduce the need for fully equipped laboratories and will enable enhanced training for students and practitioners. The final TransNow report is still in review, but the Virtual Hotmix Compactor Simulation is already available on the TransNow website (www.transnow.org) in the "What's New" section. Try out your paving skills by downloading this interactive virtual "roller."

To date, the project has led to the development of an electronic Pavement Guide: an extensive, multimedia-rich, interactive, searchable collection of linked articles, tutorials, and simulations related to all aspects of hotmix design and construction; and the three-dimensional interactive virtual "roller" that simulates, under the direct control of a user, the process of compacting hotmix asphalt from the moment it is dumped from a truck to the end of the cooling process when it cannot be effectively compacted any longer. The environment simulates the geometry of the roller and the motion on the paving lanes as well as the physics of hotmix. These tools have been demonstrated in a number of national and regional settings, including the NAPA Annual Meeting in San Francisco, APAW [American Planning Association of Washington] Joint Training (with WSDOT) in Spokane, WA, and recently at the World of Asphalt conference in Nashville, TN. It was also an exhibit in the UW [University of Washington] College of Engineering Open House in April 2003.

NAPA has expressed an interest and plans a widespread distribution of the Guide and the roller simulator. WSDOT has definite plans for distributing and using the Pavement Guide and the Roller Simulator. There are also plans to use the Guide and the roller in distance-learning activities at the University of Washington. Portions of the Guide have already been incorporated in these teaching activities. The research team plans to develop more of these types of tools in the future.

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For more information contact George Turkiyyah, UW, at george@ce.washington.edu or 206-543-8741.

WSDOT Recognizes US 12 Project Partnerships

By Jason Smith, Assistant Environmental Manager, WSDOT South Central Region

The WSDOT South Central Region (SCR) Development Branch, Environmental Office, and Real Estate Services Office would like to take the opportunity to recognize the extraordinary efforts put forth by the individuals working on the US 12, SR 124 to Wallula Corridor Environmental Assessment and the US 12, McNary Pool to Attailia Project, which is the first project within the corridor. This project included partnerships with local governments, private industry, and federal agencies.

The design engineering, environmental elements, and right of way process for this project were very complex, requiring a high degree of professionalism, innovation, and creative solutions by the production team. WSDOT could not have been successful without the assistance of the US Army Corps of Engineers (USACE) in Walla Walla, Washington, who played a pivotal role in the development of this project. In addition, the WSDOT would like to thank the regulatory and resource agency personnel who participated in the development of mitigation scenarios and streamlined their review and processing times to accommodate this coordinated project effort.

"The design engineering, environmental elements, and right of way process for this project were very complex, requiring a high degree of professionalism, innovation, and creative solutions by the production team."

Since the coalition of partnerships working on this project represented such a large coordinated effort, naming individuals would be impossible. So, we would like to recognize the professional groups that contributed substantially to the project development effort as a whole.

Thank you for your time, energy, and effort.

- **WSDOT** SCR Branch Development; SCR Environmental; SCR Real Estate Services, SCR Construction, OSC Environmental Affairs Office, OSC Landscape Architect Office, OSC Real Estate Services
- **USACE, Walla Walla** Planning Assistance to States Program, Environmental Compliance, Real Estate Services, Archeological/ Cultural Program
- **USACE, Seattle** Sec. 404 Regulatory Staff
- **United States Fish and Wildlife Services** McNary National Wildlife Refuge Staff
- **Washington State Dept. of Ecology, Olympia and Spokane** Sec. 401 Regulatory Staff
- **Washington State Dept. of Fish and Wildlife Region 3** Area Habitat Program
- **Walla Walla County**: Planning Department, Port of Walla Walla

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For more information about the project, contact Jason Smith, WSDOT Assistant Environmental Manager, at 509-575-2533 or smithjw@wsdot.wa.gov.

An Ounce of Prevention Kills Two Birds with One Stone

Thorough preparation makes its own luck.
~ Joe Poyer

An ounce of prevention beats a pound of cure.
~ Folk saying

By John W. Carpita, P.E., Public Works Consultant, Municpal Research & Services Center (MRSC)

Very few climbers scale a new peak without thorough research, planning, and preparation. Before they ever set foot on the mountain, they will have climbed it in their minds several times over, based on their own research and the experiences of other successful climbers. Managing a construction contract is not usually as dramatic as mountain climbing, but these same principles apply. If your agency is organized and thoroughly prepared beforehand, you will have fewer problems during the contract.

The basic necessities are a detailed, well-designed set of plans and contract documents, sufficient funds to cover the contract amount, and a reasonable contingency allowance. Clear policy and procedure documents will provide both accountability and structure for the contract administration team. Team members must be well versed in the technical aspects of infrastructure construction and be familiar with agency procedures and construction administration principles.

Construction Administration Policy and Procedure Plans

Every local agency should adopt policies and procedures for construction contract administration that:

- Identify needs and allocate resources for administering construction contracts.
- Identify agency and consultant construction administration team members.
- Establish the relative authority and responsibilities of team members.
- Provide for delegation of authority and responsibilities to the construction administration team by elected officials, including levels of commitment authority.
- Establish procedures and processes for timely review and disposition of change orders, claims, and field adjustments.
- Provide for decision making at the lowest level possible for change orders, claims, and field changes.
- Establish timely and routine meetings with elected officials and/or oversight committees during construction.
- Establish timely and routine meetings between the contractor and the construction administration team during construction.
- Provide for "partnering" concept with the contractor.
- Provide guidance for public relations efforts.
- Provide guidance for risk management issues.
- Establish report requirements, including frequency and formats.

Sample Definitions

- ***Change Order Item.*** A change order item is a change in the plans and detail sheets or changes in the scope of work, which result in additional costs of more than $1,000 per adjustment. This also includes contractor claims and requests for extras or force account work. Additional contract time may or may not be required.

- ***Field Adjustment.*** A field adjustment is a change in the plans and detail sheets and/or proposal quantities or minor changes in the scope of work, which result in no additional costs or in additional costs of no more than $1,000 per adjustment. This does not include contractor claims for delay or requests for extras or force account work. No additional contract time is required.

- ***Contract Amount.*** For the purposes of awarding the contract and determining the amount of the performance and payment bonds, the contract amount or total bid is the summation of the products of the quantities shown in the proposal by the unit bid prices plus state sales tax or use tax, as applicable. Quantities shown on the proposal and contract forms are estimates only, given as a basis for comparison of bids. Increases or decreases in the quantity of any bid item in relation to the proposal quantity will occur, based on conditions in the field. Also, quantities may change as a result of changes in the scope of work, as determined by the public works department, mayor, and council. The basis of payment is the actual quantity measured in the field, multiplied by the unit bid price of the item of work performed.

- ***Contract Time.*** Each contract specifies a time of completion of the project, measured in either calendar days or working days from the date that the Notice to Proceed is issued. This time of completion may be adjusted weekly due to weather conditions. In addition, changes in the scope of work of the project, changed conditions in the field, or delays by the City may be reasonable cause for extensions of contract time.

- ***Approval Authority.*** This refers to established levels of commitment and authority for changes in the contract documents at various steps in the process (i.e. legislative [governing] body, chief administrative officer, public works director, project manager, project engineer, and field inspector).

Filing Systems and Checklists

If you want to be considered invaluable to your agency, develop fool proof, easy to use filing systems and checklists for construction projects. Conversely, if you want people to question your ancestry, lose or misfile a critical document or overlook a minor but important step in the construction management process.

Checklists should allow for a date and project manager signoff at each step or item on the checklist. References to the file where the information is located may also be useful during project closeout. Adaptation of the sample checklists to agency procedures should include any permits or approvals required by the agency or by other city or county departments, as well as other local, state, and federal permits and approvals unique to the agency's location.

Standard filing systems are most effective if all project team members are familiar with the system, but only one or two people actually file the documents. This should minimize mislaid files or misfiled documents. Make sure that the exact full file location information appears on each document. Also useful is the list of documents that are typically placed in each file and pocket.

Between the checklists and standard filing system, there should be very little chance that an important piece of correspondence will get lost. Right? Murphy's Law has not been repealed, however. Many agencies keep a master log of correspondence received and sent, by either department or project. This log should always document the date received or sent, the originator of the correspondence, and to whom it was addressed. Other things that can be shown on the log include the project number, file location, date and file location of reply, and a `tickler' for the due date for the reply. An electronic version of such a correspondence log will allow fast and easy searches. There are also several correspondence and file management software packages available of varying price and complexity.

Contract Documents

Each set of contract documents is unique, tailored by the contracting agency to the needs of a specific project of a given size and complexity at a specific location. Contract document sets typically contain all or most of the following:

- Contract
- Proposal
- Addenda
- Plans
- Standard Plans and Details
- Special Provisions
- General Provisions
- Standard Specifications
- Certificates
- Affidavits
- Performance Bond
- Change Orders
- Information for Bidders
- Advertisement for Bids
- Subsurface Boring Logs (if any)

As a final check before you go out to bid, check your contract document set to make sure that all components required by the

size and complexity of the project are included. Also check to make sure there is an order of precedence clause similar to that in the *2002 Standard Specifications for Road, Bridge and Municipal Construction (see below)*.

1-04.2 Coordination of Contract Documents, Plans, Special Provisions, Specifications, and Addenda

The complete contract includes these parts: the contract form, bidder's completed proposal form, contract plans, contract provisions, standard specifications, standard plans, addenda, various certifications and affidavits, supplemental agreements, change orders, and subsurface boring logs (if any). These parts complement each other in describing a complete work. Any requirement in one part binds as if stated in all parts. The contractor shall provide any work or materials clearly implied in the contract even if the contract does not mention it specifically. Any inconsistency in the parts of the contract shall be resolved by following this order of precedence (e.g., 1 presiding over 2, 3, 4, 5, 6, and 7; 2 presiding over 3, 4, 5, 6, and 7; and so forth):

1. Addenda

2. Proposal Form

3. Special Provisions

4. Contract Plans

5. Amendments to the Standard Specifications

6. Standard Specifications

7. Standard Plans

On the contract plans, working drawings, and standard plans, figured dimensions shall take precedence over scaled dimensions. This order of precedence shall not apply when work is required by one part of the contract but omitted from another part or parts of the contract. The work required in one part must be furnished even if not mentioned in other parts of the contract. If any part of the contract requires work that does not include a description for how the work is to be performed, the work shall be performed in accordance with standard trade practice(s). For purposes of the contract, a standard trade practice is one having such regularity of observance in the trade as to justify an expectation that the Contractor, in doing the work, will observe it. In case of any ambiguity or dispute over interpreting the contract, the engineer's decision will be final as provided in Section 1-05.1.

Before You Advertise

If your agency is like most, by the time you are ready to advertise, everyone is champing at the bit and wondering why the project is not completed already. The last thing you want to hear is a suggestion that you stop and make one last check on everything before you advertise. But that's exactly what this section is all about. Even a California-style rolling stop, where you never lose momentum, will be helpful.

In larger agencies, there may be a completely different group that awards and administers the contract. In smaller jurisdictions, award and construction management is likely to be accomplished by the same people who managed the design. Even if your agency uses checklists faithfully, a final check of potential pitfalls and fatal flaws may prevent confusion and claims for delay. Have someone relatively unfamiliar with the project go through the contract documents and files and answer these questions:

- Have all required permits and approvals been obtained? Of those permits and approvals not yet obtained, are there any which will prevent the contractor from beginning work on the contract soon after the probable notice of award date?
- Has all required right-of-way been purchased? Have all permanent and/or temporary construction easements been obtained? If not, is there a danger that the contractor may not be able to construct a critical portion of the project within the anticipated schedule?
- Has the project design incorporated ADA requirements? A requirement for handicapped ramps at intersections and other ADA requirements may be triggered even if the project is an overlay of existing streets or otherwise seemingly innocuous.
- Have all potentially affected utilities been contacted? Is there evidence that the project designers went the proverbial "extra mile" to identify and resolve potential conflicts between existing utilities and those to be constructed as part of the project? Are there any potential "fatal flaw" conflicts in the overall project design that could lead to redesign and claims for delay?
- Are federal funds being used for the project? While Initiative 600 has eliminated M/W/DBE requirements in state and locally funded projects, these requirements may still exist for projects receiving direct federal funding. Similarly, federal prevailing wage requirements are different from state requirements. Both sets of requirements have to be followed on the project. Do the contract documents include these?

- Are the quantities and construction cost estimates reasonable? Have they been independently calculated and/or reviewed by someone other than the person who did the original calculations? Experienced estimators know that there are some quantity takeoffs, such as paving materials that defy exact and neat calculations and may need a certain amount of contingency for realistic estimates.
- Are there any obvious errors, inconsistencies, or confusing details on the plans or in other contract documents?

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MRSC Web site: http://www.mrsc.org/

Rock and Roll Moments

1Question: To improve the feng shui of a roadway project and, coincidentally, to miss an unmarked water main discovered during construction, your field inspector moves a storm drain manhole about 4 feet, resulting in an additional cost of $1,495 to the project. In your agency, would this be considered a field adjustment, change order, force account, or grounds for termination of the field inspector? How does your field inspector know this?

1Answer: Your agency needs policy and procedure documents that:

- Provide for delegation of authority and responsibilities to the construction administration team by elected officials, including levels of commitment authority.
- Establish procedures and processes and provide for decision-making at the lowest level possible for timely review and disposition of change orders, claims, and field adjustments.
- Establish timely and routine meetings and reporting formats with elected officials and/or oversight committees during construction.

2Question: Your $500,000 contract with Ever-Lee Brothers Construction for the Bye Bye Love Lane road construction project is going well. So well, in fact, that City Manager Neil Sedoka asks you to add another two blocks to the contract at an estimated cost of $250,000 (50% of the original contract amount). Then, John Lemon, your public works superintendent, asks you to replace a short section of sewer main on nearby Penny Lane (about $25,000 or 10% of the original contract amount) "while we have a contractor in town." What should your response be to these people? Does the amount (or percentage) of the proposed change order make a difference?

2Answer: There are no statutory restrictions on either the amount or percentage of a change order. Adopted agency policies and procedures should contain such guidelines, however. RCW Chapter 39.04 and other bid statutes anticipate that a public works project will have a well-defined scope with definite physical boundaries. The sewer main replacement on Penny Lane is clearly not in the Bye Bye Love Lane project scope and must be a separate contract. As the estimated cost is below bid limits, Ever-Lee Brothers can be awarded the contract. The additional two blocks of Bye Bye Love Lane can be added to the present contract only if they were in the original project scope and were deleted for budgetary reasons or if they were part of an additive alternative not accepted by the bid award action. Otherwise, construction of these two blocks must be competitively bid.

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Words from the Chair

One of the nice things about a column like this is that I have freedom over the topics discussed. You may recall at the end of the last issue, I had planned to discuss the evolution of Pavement Management in Idaho and Oregon. I plan to take that up in a later issue but would like to focus this issue on our upcoming fall conference as well as summarize our very successful spring conference held in April.

First, please reserve your calendars for October 20-23, 2003 for the NWPMA Fall Conference. More information on the agenda and registration information will be coming soon. The conference will be held at the DoubleTree Lloyd Center in Portland, Oregon. To check on the hotel accommodations, go to www.doubletree.com and search for the Portland, Oregon, Lloyd Center location. We obtained a very competitive package from the hotel that has allowed us a city center venue just blocks from the Oregon Convention Center, the Rose Garden Arena, and Memorial Coliseum. The hotel is located on Portland's light rail system, only 9 miles from the airport. The conference organizing committee is working hard to assemble an interesting and informative agenda.

...please reserve your calendars for October 20-23, 2003 for the NWPMA Fall Conference. More information on the agenda and registration information will be coming soon.

This year's spring conference was a definite success. Kudos to Matt Fengler, City of Tacoma, and Eric Edwards, Pierce County, for their efforts in hosting the NWPMA's Spring Conference in Tacoma, Washington on April 22-23, 2003. The conference featured an agenda geared toward technology and included an open forum on pavement management software, a pavement and asset management equipment show and, for the first time, vendor displays. From the beginning Eric and Matt had a winner with one of the best-attended spring conferences.

Craig S. Sivley, P.E., Assistant Public Works Director/City Engineer for the City of Tacoma, and Bruce Wagner, Road Maintenance Division Manager for Pierce County, gave the opening address. Craig talked about Tacoma's efforts at streamlining citizen access to Tacoma's city services through www.govme.com. He presented marketing efforts targeted at businesses that are frustrated with the lack of timely response on the part of city government. Bruce spoke about pavement management work at Pierce County. Eric Edwards then provided his presentation on "Paper Rating Forms to Personal Digital Assistants."

The remainder of the day included five presentations from NWPMA

membership and the Local Agencies Networking Forum, Share Your Idea's. The presentations were stimulating, each driving its own discussion and interaction. The open forum was also a hit. Many people shared their experiences with chip seal technology. James Curtis, from CHEC Engineering, as well as other local agency employees talked about slurry technology. After a full day of presentations, the evening began with the software symposium.

The software symposium received great participation from vendors and conference participants. Gary Cantu, City of Tacoma IS Supervisor, facilitated the event. An interview board consisting of local agency pavement managers Don Newell, Multnomah County, Oregon; Dusty Cureton, Madison County, Idaho; Howard Hamby, Spokane County, Washington; and Pat Ryan, Washington County, Oregon, submitted questions to the panel, which included James Curtis, CHEC Engineering; Derald Christensen, Measurement Research Corp; Dave Whitcher, County Road Administration Board; D. Voss, Pavement Engineers, Inc.; Sui Tan, Metropolitan Transportation Commission (Oakland, CA); Paul Sachs, Nichols Consulting Engineers; and Joel Conder and Paul Wigowsky, EIS, Inc. The panel candidly answered all the questions posed by the interview board. After the symposium, attendees adjourned to the NWPMA conference social where they enjoyed a pleasant evening in a relaxed environment.

Day two of the conference consisted of six technical presentations from local agencies as well as an equipment show. For several hours, a variety of equipment was available for viewing and discussion with equipment experts. The equipment show displayed equipment that performs video logging and automated distress collection, pavement friction testing, and pavement deflection testing.

We received some excellent feedback on potential improvements to the NWPMA website that we will be working to implement over the next several months. Please check out the website, if you haven't already.

Last but not least, the conference included some discussion about local agency websites. We received some excellent feedback on potential improvements to the NWPMA website that we will be working to implement over the next several months. Please check out the website if you haven't already. Access to the website is obtained through WSDOT's Highways and Local Programs page at www.wsdot.wa.gov/TA/T2Center/Mgt.Systems/PavementTechnology/nwpma.htm. Add this link to your favorites for quick retrieval. We will be using it more and more for information exchange.

Again, thank you to everyone for making the conference a success.

Finally, as always, if you have any comments, please e-mail me at bill.whitcomb@ci.vancouver.wa.us. I am looking forward to seeing you in Portland this autumn.

Bill Whitcomb
Chairman, NWPMA
City of Vancouver, Washington

FHWA Promotes Simpler and Smarter Ways to Protect Wildlife

By Liana Liu, PE, Traffic/Safety/ T2 Engineer, FHWA-Washington Division

The Federal Highway Administration (FHWA) announced the start of a first-of-its-kind website that highlights examples of simple and low cost methods and techniques being used to protect wildlife and fish on transportation projects.

The website is called KEEPING IT SIMPLE: Easy Ways to Help Wildlife Along Roads. It includes more than 100 "success stories" from all 50 states. The exemplary activities and processes featured range from installing nesting boxes to modifying maintenance schedules to placing wood-top rails on deer fences. Users can search the site by state and by one of four categories: "Along Roads," "On or Near Bridges," "On or Along Waterways," and "On Wetlands and Uplands."

Find the KEEPING IT SIMPLE website at http://www.fhwa.dot.gov/environment/wildlifeprotection/index.cfm

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Pedestrian Safety Campaign Toolkit

By Liana Liu, PE, Traffic/Safety/ T2 Engineer, FHWA-Washington Division

The Federal Highway Administration (FHWA) has developed a "Pedestrian Safety Campaign Planner," which is a step-by-step media guide and materials for implementing a public information and education campaign for pedestrian safety. The Planner was developed after receiving input from representatives from a wide variety of groups (state and federal government, health, law enforcement, education, etc.) that are interested in pedestrian issues. A public relations firm was contracted to take the input, produce ideas, and test them on focus groups to get the best product possible. Because of all the research and input that went into developing the campaign messages, we are confident that this product will be effective. The information is being placed at the following website address: http://safety.fhwa.dot.gov/programs/ped_bike.htm.

The information is being placed at the following website address: http://safety.fhwa.dot.gov/programs/ped_bike.htm

The Pedestrian Safety Campaign Toolkit includes:

- 1 Beta video with 4 TV public service announcements
- 1 CD with six 30-second radio public service announcements
- 1 Pedestrian Safety Campaign Planning Guide
- 2 full color posters, 24" x 36"
- 3 full color posters, 11" x 17"
- 2 brochures
- 15 print public service announcements
- 8 cinema slides
- 6 press releases
- 15 newspaper articles
- Graphic images for promotional materials

Due to the expense of producing the materials and the limited quantities available, we ask that only individuals, organizations, and local communities who are committed to implementing the campaign request the materials.

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For more information about the campaign or to find out how you can obtain a copy of the campaign materials, please contact Tamara Redmon, tamara.redmon@fhwa.dot.gov, or Leverson Boodlal, leverson.boodlal@fhwa.dot.gov. The mailing address is Federal Highway Administration, 400 Seventh Street, SW, Room 3407, Washington DC 20590.

FHWA-Produced Video on Utility Coordination

By Liana Liu, PE, Traffic/Safety/ T2 Engineer, FHWA-Washington Division

The prestigious Crystal PACE public relations award was given to a video co-produced by the Federal Highway Administration (FHWA) that shows how greater cooperation between utilities and transportation agencies can save time and money on highway projects.

FHWA produced the video with the American Association of State Highway and Transportation Officials (AASHTO). The video is called "CCC: Making the Effort Works!" The CCC in the title refers to "communication, coordination and cooperation."

The video shows how good communication and strong coordination between highway agency pre-construction staff and utility company engineers (with planning, budgeting, and utility relocation responsibility for a project) can better understand competing needs, recognize the actions to avoid construction delays, and be motivated to work in partnerships.

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To obtain a copy of the video or to receive further information about improved utility coordination, call Chris Newman, Office of Asset Management in the Federal Highway Administration, at 202-366-2023, 400 7th St. SW, Washington, DC 20590.

FHWA Safety Activities

Reprinted from FHWA Safety Activities, May/June, 2003

Guidance for Using Red Light Cameras

The Federal Highway Administration and National Highway Traffic Safety Administration have developed a Guidance For Using Red Light Cameras. The information is being placed at the following website address: http://safety.fhwa.dot.gov/rlcguide/index.htm

FHWA Safety R&D Study: Characteristics of Emerging Road and Trail Users and Their Safety

Persons using in-line skates, scooters, strollers, electric bicycles, adult tricycles, recumbents, tandems, trailers, golf carts, and assisting technologies such as electric scooters and motorized wheelchairs on our nation's pedestrian travel ways and trails have characteristics that were not considered in the original design but could affect the safety performance of these facilities. Planners and engineers have limited knowledge of the effect of these users' operational and design characteristics. In response to this gap in knowledge, FHWA is conducting a study that will attempt to:

- Identify characteristics of the users of pedestrian facilities that may affect facility design, operation, and safety;
- Investigate the safety of these users in the environments in which they operate; and
- Compile this information for individuals responsible for the planning, design, operation, and maintenance of pedestrian and bicycle facilities.

For more information contact Ann Do at ann.do@fhwa.dot.gov or 202-493-3319.

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FHWA Safety Programs

Reprinted from FHWA Safety Programs, May/June, 2003

Restoring Credibility to Speed Setting: Enforcement & Educational Issues

[This report] is now available on the FHWA Speed Management Safety Website at http://safety.fhwa.dot.gov/programs/speedmgnt.htm. The report summarizes the findings of workshops that brought together critical engineering, enforcement, and judiciary personnel to discuss the multi-disciplinary aspects of managing speed. A "planning guide" for others who want to sponsor multi-disciplinary speed management workshops is under development. Contact Beth Alicandri, 202-366-6409 or Davey Warren, 202-366-4668.

Crashworthiness of Roadside Safety Hardware:

Since October 1, 1998, virtually all roadside hardware installed on the National Highway System must meet the crash evaluation criteria identified in NCHRP Report 350. The compliance date for transitions to bridge railings and for precast concrete barriers was extended to October 1, 2002. See http://safety.fhwa.dot.gov/report350hardware. This site provides information on accepted devices and related FHWA policies. Contact Richard Powers, 202-366-1320: Permanent and Temporary Barriers, Terminals, Bridge Railings/Transitions, and Crash Cushions. Contact Nicholas Artimovich, 202-366-1331: Work Zone Devices, Sign Supports, and Poles.

National Work Zone Safety Information Clearinghouse:

The Clearinghouse provides a single contact for information and technical assistance concerning the safe and effective operation of work zones. Clearinghouse: 888-447-5556, Fax: 979-845-0568, http://wzsafety.tamu.edu. Contact Ann Walls, 202-366-6836.

Iowa National Model:

Iowa and FHWA have collaborated with NHTSA and FMCSA to develop of [sic] a model public safety information system for data collection and management. One of the principal products is a software package (TraCS) that facilitates conversion of forms from paper to electronic, and development of new electronic forms. TraCS has been distributed for free use in Alabama, Arizona, Arkansas, Colorado, Delaware, Georgia, Iowa, Nevada, New Hampshire, New York, Oklahoma, South Carolina, Tennessee, and Wisconsin. TraCS is in use in about 200 local enforcement agencies in Iowa. Several additional states have the free software for evaluation purposes. http://www.dot.state.ia.us/natmodel Contact the Office of Safety Design, 202-366-9198.

International Association of Chiefs of Police (IACP) Clearinghouse:

The clearinghouse provides agency managers with information on automation projects to help them make more informed decisions on what technology to purchase and use for the collection and distribution of traffic crash data. http://www.iacptechnology.org Contact David Smith, 202-366-6614.

FHWA Safety Resources

Partial reprint from FHWA Safety Resources, May/June, 2003

Technical Advisory (T5040.35):

Contains information on the state-of-the-practice for the design and installation of shoulder rumble strips and provides guidelines for their use on appropriate rural segments of the National Highway System (NHS). The Technical Advisory is posted at: http://www.fhwa.dot.gov/legsregs/directives/techadvs.htm.

Safety Management Self-Assessment:

This is a tool to enable States to evaluate their safety management processes. This self-assessment combines previous guidance on safety management with the seven quality principles of the Malcolm Baldridge National Award criteria. Contact Ken Epstein, 202-366-2157.

Safety Starts With Crash Data Video

This video is designed to encourage law enforcement personnel who collect data at crash scenes to thoroughly investigate these crashes and submit accurate, complete and timely crash reports. The video, which is divided into a 15-minute comprehensive segment and an 8-minute summary version, can be used at roll calls, at basic and unit training, and in formal crash investigation training. To request a copy contact FHWA Product and Distribution Center at 301-577-0818.

Night Lights - How Retroreflectivity Makes Our Roads Safer Video

Retroreflectivity Sheeting Identification Guide

For additional information, please visit the FHWA retroreflectivity web site at http://safety.fhwa.dot.gov/programs/retroref.htm or contact Peter Hatzi at peter.hatzi@fhwa.dot.gov, Kenneth Opiela at kenneth.opiela@fhwa.dot.gov, or Greg Schertz at greg.schertz@fhwa.dot.gov.

AASHTO Roadside Design Guide, Web Based Training NHI Course Number: 380032C

This web-based course is approximately 14 hours and is available anytime-24 hours, 365 day a year via the Internet. The cost for non-FHWA employees is $230 per participant and includes a copy of the 2002 AASHTO "Roadside Design Guide". The course provides an overview of the 2002 AASHTO "Roadside Design Guide". Emphasis is on current highway agency policies and practices. Participants must register online at http://www.nhi.fhwa.dot.gov/reg01000.asp.

Spanish Versions of Everyone Is A Pedestrian:

A set of brochures developed to teach pedestrians how to navigate through work zones, understand pedestrian signs and signals, and how to navigate around large trucks. Contact Tamara Redmon, 202-366-4077.

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Washington State Wins Award for Scenic Byways Project

By Liana Liu, PE, Traffic/Safety/T2 Engineer, FHWA-Washington Division

The Federal Highway Administration (FHWA) and two of its partners at the National Scenic Byways Conference in Albuquerque, NM recognized projects in eight states with national awards for contributions to enhance, preserve, and promote America's byways. Washington State was one of the winners with the "Mountains to Sound Greenway - I-90" project.

Less than 10 years ago, standing on the steep slopes of a 4,500-foot mountain located just east of North Bend afforded a breathtaking view of the Snoqualmie Valley, according to sponsors of the project. From below, however, the mountain presented a different face. Abandoned logging roads marred the face of the peak. Highly visible from the interstate below, these scars detracted from the landscape, and the instability of the site presented hazards to the communities below. For two summers, volunteers, inspired to restore the natural features of the peak, laid biosolids compost, hay, and grass seed, and planted trees as part of a creative Re-greening Partnership led by the Mountains to Sound Greenway Trust. The scars have slowly begun to fade and new growth has taken hold.

A publication highlighting the winners can be obtained by contacting the America's Byways Resource Center at 1-800-429-9297 or online at www.byways.org. ▲

APWA North American Snow Conference

By Peter Lyon, WSDOT Border Technology Exchange Program (BTEP) Coordinator

Dave Bierschbach, WSDOT North Central Region Operations Engineer, and Ed Boselly, WSDOT Headquarters Maintenance, participated in the APWA North American Snow Conference in Quebec City, Quebec, Canada on April 27-30, 2003. Dave gave a presentation on Winter Storm Management, and Ed gave a presentation on WSDOT's Salt Pilot Project. Their presentations were well attended and generated many questions, feedback, and interactive discussion. They also had the chance to participate in other sessions and a trade show that was part of the conference. Some of the topics included winter maintenance management, roadway weather information systems, the use of liquid and solid chemicals in winter operations, public involvement policies, vehicle tracking, performance measures, and equipment usage. These sessions gave a larger perspective of national and international winter maintenance issues than would have normally been presented at the state level.

Following are some specific issues of interest from the conference:

- Environment Canada is looking at declaring salt to be toxic to the environment. The Canadian provinces are very concerned about how this will affect their ability to fight snow and ice. A compromise on this issue may result with more tracking and documentation on salt use and the development of best management practices when using salt.
- In the U.S. and Canada, many wing plows are mounted just behind the front plow rather than a mid-mount (like WSDOT uses) for better visibility of the plow. However, this does require a higher front axle rating than the normal standards.
- Ed witnessed a demonstration of a new optical technology that will allow remote determination of pavement conditions, such as snow, ice, wet, and dry.
- Other agencies' experience in communicating real time data from trucks for data gathering, performance measurement, and improvement purposes was a very useful topic.
- Many local governments in Canada are responsible for clearing snow from sidewalks in urban and residential areas. They have special narrow snowcats for plowing, sanding, and blowing sidewalks. Several of these agencies are also prohibited from leaving snow berms in driveways. The Canadians outsource much more of their winter maintenance than is done in the U.S.

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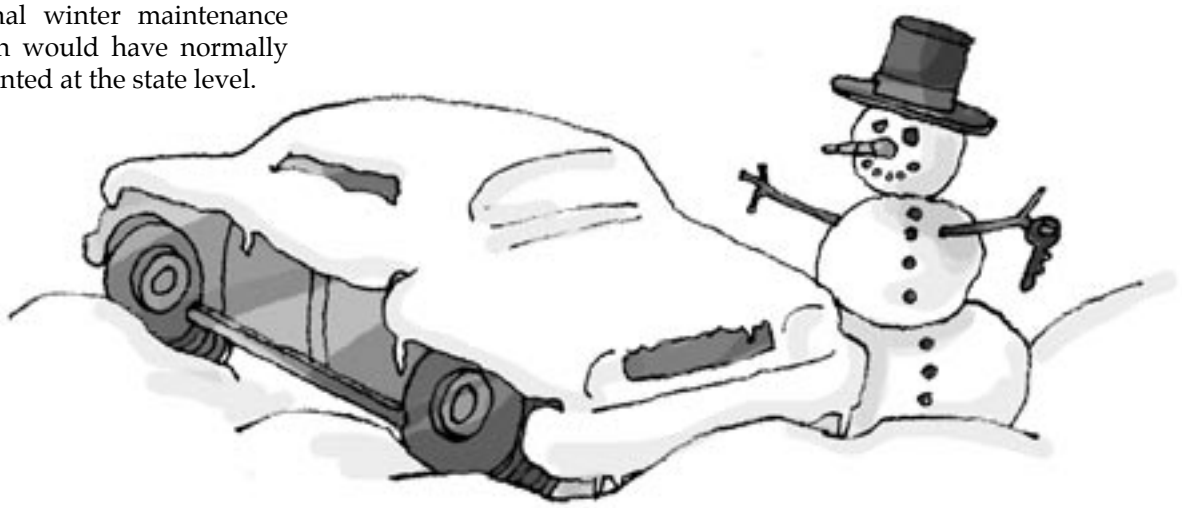

Online Photographs

Lake Washington Bridge, night view of east tunnel portals. Photographer: A.G. Simmer. Washington State Department of Transportation. Repository: Washington State Archives.

Lake Washington Bridge, looking toward Mercer Island. Photographer: A.G. Simmer. Washington State Department of Transportation. Repository: Washington State Archives.

Spokane Falls and River under Monroe St. Bridge. Photographer: Libby. Washington State Dept. of Community, Trade and Economic Development. Repository: Washington State Library

By Jennifer Boteler, WSDOT Librarian

Are you producing a report and would like a photograph for the cover or as an illustration? Have you ever wondered how a particular road, street, or bridge looked during a certain time period? Are you trying to document changes of road designs and transportation structures? There are many libraries, museums, and historical societies that have photograph collections that just might fit your needs.[1] But if you are unable to visit an institution to peruse their photograph collections, online collections of photographs are available that include pictures relating to transportation. A word of caution if you wish to reproduce one of the images that you find online. Just because a picture is accessible online, it does not mean that it is in the public domain and can be used freely. Most websites will include information about copyright restrictions and how to obtain reproductions. Reproductions may be subject to donor restrictions and copyright law.

Here is a sampling of websites that include transportation related pictures.

Local

Seattle's Museum of History And Industry (MOHAI)
http://www.seattlehistory.org/

At this site you can search selected pictures from MOHAI's 1.5 million image photograph collection.

Tacoma Public Library's Photography Archive
http://search.tpl.lib.wa.us/images

This is an extensive photograph collection, documenting the social, industrial, commercial, and agricultural growth and development of Washington and the Pacific Northwest.

Yakima Memory Project
http://www.yakimamemory.org/

The Yakima Memory Project includes 9000 digitized photographs from the Relander Collection at the Yakima Valley Regional Library and the Sundquist Research Library at the Yakima Valley Museum. In addition to searching by keyword, try browsing the Yakima Valley Transportation Company, and the Railroad collections.

State

Washington State Department of Transportation Library - Biennial Reports Images
http://www.wsdot.wa.gov/hq/library/

Here you will find scanned images from our collection of Washington State Highway Commissioner (Commission) Biennial Reports, 1906-1968.

University of Washington Libraries - Digital Collections
http://content.lib.washington.edu/all-collections.html

You can search for images across all UW's digital collections or search just by collection, such as Transportation, Washington Localities, or Asahel Curtis Photo Company.

Washington State University - Manuscripts, Archives and Special Collections
http://www.wsulibs.wsu.edu/holland/masc/imagedatabases.htm

You can search across all collections by keyword or browse collections of digital photographs by predefined searches. For example: Hutchison Studio Photographs- Automobiles; Frank S. Matsura Image Collection- Railroads; City of Pullman and the Palouse Image Collection- Main Street.

Federal

Department of Energy - Digital Archives
http://www.doedigitalarchive.doe.gov/doeimage/enter.cfm

At this site you can narrow your search by state and DOE Site (i.e. Hanford Site, and Pacific Northwest National Laboratory).

Federal Emergency Management Agency - Photo Library
http://www.photolibrary.fema.gov/photolibrary/index.jsp

Under Photograph Category, you can restrict by type of disaster. For example, if you pick the "Earthquake" category and enter bridge in the keywords box, you'll get pictures of damaged bridges after an earthquake.

National Archives and Records Administration - Archival Research Catalog
http://www.archives.gov/research_room/arc/index.html

If you only want photographs, in the Type of Archival Material box choose "Photographs and Other Graphic Material." If the photograph is available digitally online, after the ARC Identifier number it will say Digital Copy Available.

Library of Congress - Prints & Photographs Online Catalog (PPOC)
http://www.loc.gov/rr/print/catalogabt.html

The PPOC catalog contains records and digital images of pictures held by the Prints & Photographs Division of the Library of Congress. About 90% of the records are accompanied by one or more digital images.

International

University of Wisconsin-Milwaukee, Transportation Around the World: 1911-1993
http://www.uwm.edu/Library/digilib/transport/index.html

Pictures on this website represent a wide variety of transportation methods used in countries across the globe. You can restrict your search by transportation mode/facility/type, country, and state.

TrafficLinq - Pictures
http://www.trafficlinq.com/pictures.htm

TrafficLinq is a Traffic Engineering and Transportation Engineering (Internet) Search Directory out of the Netherlands. Scroll down and click on English to view instructions on searching for pictures.

You can also search for pictures on the Internet using search engines. Following are examples of image search engines:

- Picsearch http://www.picsearch.com/
- FreeFoto http://www.freefoto.com/index.jsp

Many standard search engines have a special feature that allows you to search just for images, such as:

- AltaVista http://www.altavista.com/image/default
- Google http://www.google.com/imghp
- Ixquick (meta-search engine, click on radio button for pictures) http://www.ixquick.com/

However, using Internet search engines may not be the most efficient way to find photographs. Because other types of images (clip art, logos, maps, advertisements, etc.) are also searched along with photographs, you will get a lot of irrelevant hits to sort through. For instance, if you search for "interstate" you could pull up an interstate traffic sign, an ad for an interstate trucking company, or a map of an interstate route. But you can find some interesting pictures that have been posted on other websites. Again, be cognizant of copyright issues. You shouldn't download a picture from another website and use it without first determining you have the copyright holder's permission.

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If you would like assistance in navigating these websites or finding pictures from other sources, please contact the WSDOT Library at (360) 705-7750 or library@wsdot.wa.gov.

[1] The WSDOT Library collection used to include photographs of transportation in Washington State. In early 2001, WSDOT management determined that the Historical Collection would be transferred to State Archives. For questions concerning access to these photographs, contact State Archives at (360) 586-1492 or archives@secstate.wa.gov

New Features To

DIPs

(Digital Imaging Platforms)

By Roger Chappell, WST2 Technology Integration Engineer, WST2 Center

I was speaking at a GIS (Geographic Information Systems) conference last year when one of the attendees asked, "What is Ground Based Imaging (GBI)?" That was a good question. Sometimes it is easy to get caught up in the technology we are involved in and forget to answer the simple questions like, what is it and how will it improve my life.

First, what is Ground Based Imaging (GBI)? There is Space Based Imaging of various types and resolutions, and there are various types and resolutions of aerial photography and imaging. GBI is simply another perspective of the same data. Instead of a view looking down from above, your perspective base is roughly from the same vertical and horizontal plane as the data itself. From a space based or aerial image, you can only see the top of the post; with GBI you can read the sign. And as with other imaging technologies, there are a wide variety of product types and resolutions available to fit your imaging needs.

There is a big difference between taking a picture out of the window of an airplane with a point-and-shoot camera and an orthophoto. The same holds true for GBI; the equipment used and the procedures followed will largely determine the results that are achieved.

A DIP consists basically of a camera or image collection system mounted on a mobile platform (a vehicle).

Since there are so many varieties of equipment and procedures used in GBI, I would like to narrow down the spectrum to what I call DIPs (Digital Imaging Platforms). A DIP consists basically of a camera or image collection system mounted on a mobile platform (a vehicle). Most of these systems integrate some type of spatial referencing of images such as GPS (Global Positioning System) and /or LRS (Linear Referencing Systems or "Mile Posts"). In the Spring 2001 edition of the *WST2*, I wrote an article featuring this technology and Thurston County's version of it. The article is available on the web at http://www.wsdot.wa.gov/TA/T2Center/Mgt.Systems/InfrastructureTechnology/TechnicalArticles.html and features some of the history of DIP technology and usage. At the writing of today's article, I am aware of over seven systems that are currently operating within the Northwest. Five of those systems have been built by state and local agencies, and the list continues to grow. These agencies have answered, for themselves, the second part of our starting question, how will it improve my life? Some of the agencies are using this technology for asset management, risk management, access management, and vegetation management, just to name a few. The possibilities seem endless. Imaging, whether it is done from the ground or air, is a data rich environment that contains thousands of pixels of data.

Imaging is really all about data. The better you are able to capture, retrieve, reuse, and analyze the data, the more useful it becomes. DIPs were designed with this purpose in mind, and they have been doing this very effectively. They are able to capture very large amounts of data in short periods of time.

The first generation systems were able to bring much of what was seen in the field to the desktops of the people who analyzed and man-

Workstation used to test the 360-degree camera

A close-up of the 360-degree camera.

aged the infrastructure. Today's fifth generation systems are able to deliver much more. As the use of imaging products continues to expand, so does the desire for better resolution and wider ranges of visibility.

Recently, Washington State Department of Transportation's (WSDOT) Transportation Data Office staff developed SR View 2.0. They reasoned that if one camera was good, then two would be even better, and they were right. It produced almost twice as much data to analyze. SR View 2.0 is two images taken from the same location that can be used separately or overlapped to create panoramic images. With more image coverage and thousands more pixels of data now available, the possibilities of use for this data continue to grow. Before SR View 2.0 was in full production, there was talk of imaging in complete 360-degree image views. It was felt that 360-degree images would give data analysts and decision makers the most comprehensive view of the infrastructure they were managing. So, building on their successful deployment of the SR View 2.0 program, the WSDOT Transportation Data Office embarked on what is currently being called SR View 360. The equipment is currently being assembled and data collection should begin this year. The technology that the Transportation Data Office is using will produce a dome shaped spheroidal image. This will allow for a better view of things overhead, like signalization, along with a conventional 360-degree image. I believe this will go a long way to bringing the data captured in the field to the desktops of those using the data.

General information about Ground Base Imaging and Digital Imaging platforms can be found on the web at http://www.wsdot.wa.gov/TA/T2Center/Mgt.Systems/InfrastructureTechnology/SRview/srat.htm.

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For more information about SR View 360, contact Glenn Davis at (360) 570-2365 or at Davisgl@wsdot.wa.gov. Or visit the Transportation Data Office website at http://www.wsdot.wa.gov/mapsdata/tdo/srweb.htm

WST2 Resources

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This order form is available on the WSDOT Homepage at:

http: www.wsdot.wa.gov/TA/T2Center/T2PUBS.htm

Fax, e-mail, phone, or mail your order to:
Fax: (360) 705-6858; E-mail: WST2Center@wsdot.wa.gov; Phone: (360) 705-7386;
Mail: WST2/WSDOT, H&LP, P.O. Box 47390, Olympia, WA 98504-7390.

✓ Check the items you would like to order. An asterisk (*) denotes publications included in the 2003 WST2 CD Library.

- 1999 Audio Visual Catalog, T2Center
- 2003 WST2 CD Library: Technical Documents
- Asphalt Pavement Repair Manuals of Practice, SHRP, 1993*
- Asset Management Primer, FHWA, 1999
- A Walkable Community is More Than Just Sidewalks, FHWA, 2000
- Bicycle & Pedestrian Case Studies: No. 7: Transportation Potential & Other Benefits of Off-Road Bicycle & Pedestrian Facilities, FHWA, 1992 No. 14: Benefits of Bicycling and Walking to Health, FHWA, 1993 No. 15: Environmental Benefits of Bicycling & Walking, FHWA, 1993
- Bicycle and Pedestrian Provisions of the Federal-Aid Program, FHWA, 1998
- Building Projects that Build Communities, Community Partnership Forum, 2003
- Concrete Pavement Repair Manuals of Practice, SHRP, 1993*
- Concrete PASER Manual, University of Wisconsin, 1998
- Contracting for Professional Services in Washington State, MRSC, 1994
- Crack Seal Application, FHWA, 2001
- Data Integration Primer, FHWA, 2001
- Designing Sidewalks and Trails for Access, Part 2, FHWA, 2001
- Dust Control on Low Volume Roads, FHWA, 2001
- Dust Palliative Selection and Application Guide, USFS, 1992*
- Engineer's Pothole Repair Guide, US Army Corps of Engineers, CRREL, 1984
- Entering the Quiet Zone: Noise Compatible Land Use Planning, FHWA, 2002
- Family Emergency Preparedness Plan, American Red Cross, et al., 1999
- Field Guide for Unpaved Rural Roads, Wyoming T2 Center, 1997
- Fish Passage Through Culverts, FHWA, USDA, 1998
- General Field Reference Guide (Pocket Size), 2002
- Geotextile Selection and Installation Manual for Rural Unpaved Roads, FHWA, 1989
- Getting People Walking: Municipal Strategies to Increase Pedestrian Travel, Rhys Roth, Energy Outreach Center
- Gravel Roads – Maintenance and Design Manual, SD LTAP, 2000*
- A Guide to the Federal-Aid Highway Emergency Relief Program, USDOT, June 1995
- A Guide for Local Agency Pavement Managers, NWT2 Center, 1994*
- A Guide for Erecting Mailboxes on Highways, AASHTO, 1984
- Highway/Utility Guide, FHWA 1993
- HMA Pavement Smoothness, FHWA, 2002
- Increasing Physical Activity Through Community Design, National Center for Bicycling and Walking, 2002
- Improving Conditions for Bicycling and Walking, FHWA, 1998
- Improving Highway Safety at Bridges on Local Roads and Streets, FHWA, 1998
- International State-of-the-Art Colloquium on Low-Temperature Asphalt Pavement Cracking, CRREL, 1991
- Local Agency Pavement Management Application Guide, WST2 Center, 1997*
- Local Agency Safety Management System, WSDOT, 1998, Reprinted 2000*
- Local Low Volume Roads and Streets, ASCE, 1992
- Maintenance of Aggregate and Earth Roads, WST2 Center (1994 reprint)
- Maintenance of Signs & Sign Supports for Local Roads and Streets, FHWA, 2001
- Manual for Controlling and Reducing the Frequency of Pavement Utility Cuts, FHWA, 2002
- Manual of Practice for an Effective Anti-icing Program: A Guide for Highway Winter Maintenance Personnel, FHWA, 1996*
- New Generation of Snow and Ice Control, FHWA
- Pavement Surface Condition Field Rating Manual for Asphalt Pavement, NWPMA, WSDOT, 1999*
- Pedestrian Facilities Guidebook, WSDOT, 1997
- Planning & Implementing Pedestrian Facilities in Suburban and Developing Rural Areas, TRB
- Pothole Primer – A Public Administrator's Guide, CRREL, 1989
- Recommendations to Reduce Pedestrian Collisions, WSDOT, December 1999
- Redevelopment for Livable Communities, Rhys Roth, Energy Outreach Center, 1995
- Reflective Sheeting Identification Guide, FHWA, 2001
- Roundabouts: An Information Guide, FHWA, 2000
- School Administrator's Guide to School Walk Routes and Student Pedestrian Safety, Washington Traffic Safety Commission and WSDOT, 2003
- Signposts for Snow Trails, USDA, 1998
- Soil Bioengineering: An Alternative for Roadside Management, USDA-FS, 2000
- State-of-the-Art Survey of Flexible Pavement Crack Sealing Procedures in the United States, CRREL, 1992
- Streetwise, A Simplified Local Agency Pavement Management System, WSDOT, 2000*
- Superpave System – New Tools for Designing and Building More Durable Asphalt Pavements, FHWA
- Traffic Calming: A Guide to Street Sharing, Michael J. Wallwork, PE, 1993
- Trail Construction & Maintenance Notebook, USDA Forest Service, 2000

- Unsurfaced Road Maintenance Management, CRREL, 1992
- Utility Cuts in Paved Roads, Field Guide, FHWA, 1997
- W-Beam Guardrail Repair and Maintenance, FHWA, 1996
- Washington Bicycle Map, WSDOT, 2001
- Washington State Highway Map, WSDOT, 2002
- Wetland Trail Design and Construction, USDA, 2001
- Wildlife Habitat Connectivity Across European Highways, FHWA, 2002

Workbooks and Handouts from WST2 Center Workshops

- Access Management, Location and Design, FHWA, (NHI) 2001
- Application of Geographic Information Systems for Transportation, FHWA, 1999
- Construction Documentation: Construction Training Manual for Local Agencies, WSDOT, 2003
- Design, Construction and Maintenance of Highway Safety Features and Appurtenances, FHWA, 1997 (update included)
- Environmental Overview, LAG Manual Chapter 24, WSDOT, 2003
- Handbook for Walkable Communities, by Dan Burden and Michael Wallwork
- Pavement Maintenance Effectiveness/ Innovative Materials Workshop Participant's Handbook

Videotapes

- Driving Modern Roundabouts, City of Lacey, City of Olympia and WSDOT, 2002
- Walkable Communities: Designing for Pedestrians, Dan Burden, $50/set of 4 videotapes

CD ROM

- Best Practices for Road Weather Management, FHWA, August 2002
- Building Projects that Build Communities, WSDOT, 2003
- Driving Modern Roundabouts, City of Lacey, City of Olympia and WSDOT, 2002
- Gravel Roads: Maintenance and Design Manual, SD LTAP, 2000*
- Pedestrian/Bicycle Crash Analysis Tool, FHWA, 1999
- Pedestrian/Bicycle Safety Resource Set, FHWA, 2000
- Pavement Preservation: State of the Practice, FHWA, July 2000
- Technology Transfer CD Library Technical Documents, 4th Edition, Spring 2003

DVD

- Driving Modern Roundabouts, City of Lacey, City of Olympia and WSDOT, 2002

Non-Credit Self-Study Guides

These non-credit WSDOT self-study guides may be obtained from the WST2 Center. An invoice will be sent with the books.

- Basic Surveying, $20
- Advanced Surveying (metric), $20
- Contract Plans Reading, $25
- Technical Mathematics l, $20
- Technical Mathematics ll, $20
- Basic Metric System, $20

Computer Programs

The following applications may be downloaded from the Washington State Department of Transportation Materials Laboratory Web page at www.wsdot.wa.gov/biz/mats/Apps/EPG.htm.

Everseries Pavement Analysis Programs contains three independent modules:

1. Evercalc 5.0 – A FWD Pavement Moduli Backcalculation Program
2. Everstress 5.0 – A Layered Elastic Analysis Program
3. Everpave 5.0 – A Flexible Pavement Overlay Design Program

Important: These programs are updated regularly. Please send your e-mail address to sivanen@wsdot.wa.gov to be included in the mailing list for updates.

Falling Weight Deflectometer (FWD) Area Program - This program is useful in calculating Normalized Deflections Area Value and Subgrade Moduli from FWD Data. The program is available for download at www.wsdot.wa.gov/biz/mats/pavement/fwd.htm.

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Online Resources

Bridge

- WSDOT Highways & Local Programs www.wsdot.wa.gov/TA/Operations/BRIDGE/BRIDGEHP.HTM

Environmental

- Environmental Procedures Manual (M31-11)www.wsdot.wa.gov/eesc/environmental/programs/regcomp/ProceduresManual/start.pdf
- Regional Road Maintenance Endangered Species Act Program Guidelines www.metrokc.gov/roadcon/bmp/pdfguide.htm
- National Marine Fisheries Service Species Listings & Info www.nwr.noaa.gov/
- U.S. Fish and Wildlife Service Species Listings & Info http://endangered.fws.gov/
- Washington State DNR's Natural Heritage Program Home Page www.wa.gov/dnr/htdocs/fr/nhp/refdesk/fsrefix.htm
- FHWA's Environmental Home Page www.fhwa.dot.gov/environment/index.htm

Highways & Local Programs List Serves

- Local Agency Guidelines (LAG) Manual http://lists.wsdot.wa.gov/guest/RemoteListSummary/LAGG
- Traffic and Safety Management http://www.t2sms-l@lists.wsdot.wa.gov/guest/RemoteListSummary/T2SMS_L
- Pavement Management http://lists.wsdot.wa.gov/guest/RemoteListSummary/T2PAVE_L
- WST2 Newsletter http://lists.wsdot.wa.gov/guest/RemoteListSummary/T2News_L
- WST2 Training http://lists.wsdot.wa.gov/guest/RemoteListSummary/T2TRNG_L

Infrastructure

Management & GIS/GPS

The site below has been established to promote interagency data exchange and resources sharing between local governmental agencies.

www.wsdot.wa.gov/TA/T2Center/Mgt.Systems/InfrastructureTechnology/InfaThp.html

Legal Search

- Search RCWs and WACs http://search.leg.wa.gov/pub/textsearch/default.asp
- City Streets as part of State Highways www.wsdot.wa.gov/TA\Operations\LAG\CityStreets.html

Local Agency Guidelines (LAG) Manual

http://www.wsdot.wa.gov/TA/Operations/LAG/LAGHP.htm

Pavement Management

- Pavement Publications & NWPMA Links http://www.wsdot.wa.gov/TA/T2Center/Mgt.Systems/PavementTechnology
- NWPMA - North West Pavement Management Association www.wsdot.wa.gov/ta/T2Center/Mgt.Systems/PavementTechnology/nwpma.html
- Asphalt Institute www.asphaltinstitute.org/
- National Asphalt Pavement Association www.hotmix.org/
- Pavement (A Web Site for Managing Pavements) www.mincad.com.au/pavenet
- SuperPave Information www.utexas.edu/research/superpave

Project Development

- Federal Aid Progress Billing Form http://www.wsdot.wa.gov/TA/ProgMgt/Projectinfo/BILLFORM.XLS
- State Funded Progress Billing Form http://www.wsdot.wa.gov/TA/ProgMgt/Projectinfo/BILLFORMSTATE.xls
- STIP (State Transportation Improvement Program) http://www.wsdot.wa.gov/TA/ProgMgt/STIP/STIPHP.htm
- TIP (Local Agency 6-Year Transportation Improvement Program) http://www.wsdot.wa.gov/TA/ProgMgt/STIP/TIP.html

Research

- WSDOT Research Office http://www.wsdot.wa.gov/ppsc/research
- Looking for a Transportation Research Publication? www.nas.edu/trb/index.html
- Municipal Research and Services Center of Washington www.mrsc.org

Traffic & Safety

- Safety Management Publications & Information http://www.wsdot.wa.gov/TA/T2Center/Mgt.Systems/SafetyTechnology/
- WSDOT Traffic Data Office http://www.wsdot.wa.gov/mapsdata/tdo/
- Washington State Patrol www.wa.gov/wsp/wsphome.htm
- Washington Traffic Safety Commission www.wa.gov/wtsc
- National Highway Traffic Safety Administration www.nhtsa.dot.gov
- American Traffic Safety Services Association www.atssa.com
- Municipal Research and Services Center of Washington www.mrsc.org
- Transportation Research Board www.nas.edu/trb/index.html

Training

- WST2 Classes & LAG Training http://www.wsdot.wa.gov/TA/T2Center/Training/
- WST2 Class Registration http://www.wsdot.wa.gov/TA/T2Center/t2hp.html
- County Road Administration Board http://www.crab.wa.gov/
- American Public Works Association www.apwa.net/education
- Transportation Partnership in Engineering Education Development (TRANSPEED) http://www.engr.washington.edu/epp

WSDOT Local Programs Engineers

- Eastern Region (Spokane) Keith Martin (509) 324-6080, martink@wsdot.wa.gov
- Northwest Region (Seattle) Terry Paananen (206) 440-4734, paanant@wsdot.wa.gov
- Olympic Region (Olympia) Mike Horton (360) 357-2666, hortonm@wsdot.wa.gov
- North Central Region (Wenatchee) Paul Maher (509) 667-3090 or 667-2900, maherp@wsdot.wa.gov
- South Central Region (Yakima) Roger Arms (509) 577-1780, armsr@wsdot.wa.gov
- Southwest Region (Vancouver) Bill Pierce (360) 905-2215, pierceb@wsdot.wa.gov

Other Online Resources

- Bicycle maps and other information http://www.wsdot.wa.gov/TA/PAandI/PAIHP.html
- Pedestrian information http://www.wsdot.wa.gov/TA/PAandI/PAIHP.html
- Rural Partnerships and scenic byways information http://www.wsdot.wa.gov/TA/PAandI/PAIHP.html
- Better Mousetraps http://www.wsdot.wa.gov/ta/T2Center/Mousetraps/
- Retired Professional Program http://www.wsdot.wa.gov/TA/T2Center/Retired.htm
- Student Referral Program http://www.wsdot.wa.gov/TA/T2Center/StudentReferral/
- LTAP (Local Technical Assistance Program) Clearing House www.ltapt2.org
- Institute of Transportation Engineers www.ite.org
- Washington State Counties http://access.wa.gov/government/awco.asp
- Washington State Cities and Towns http://access.wa.gov/government/awcity.asp
- Governor's Office of Indian Affairs http://www.wa.gov/goia/index.html
- Southwest Interagency Coop - Grounds Equipment Maintenance (GEM) www.gematwork.org

Training Opportunities

Laurel Gray, WST2 Training Program Coordinator

Washington State T2 Center

Contact: Laurel Gray (360) 705-7355
Wendy Schmidt (360) 705-7386
http://www.wsdot.wa.gov/TA/T2Center/Training

To register for a class in this section, use the contact listed above.

The class fees shown apply to both public and private sector students. Classes marked with an asterisk (*) are part of the Road and Street Management Training Program and fulfill a portion of the core requirements needed for the Certificate of Achievement in Road Management.

Registrations are being accepted for all of the following T2 classes.

Right of Way Plans Preparation (LAG Program)

September 9, Shoreline; September 16, Tumwater; September 30, Wenatchee; October 1, Yakima; October 22, Spokane; October 7, Vancouver; November 4, Everett; November 6, Lacey. 8 a.m. to 12 p.m. $50. This course will give attendees a general overview of the different elements involved in preparing right of way plans and other mapping required for the acquisition of real property or property rights from private individuals or other government agencies.

Pavement Condition Rating*

September 9-10, Tacoma. $45. Instructor: Bob Brooks. Participants will learn to rate any of the pavements commonly found in Washington. The rating values obtained using the definitions and methods learned in this course should compare favorably with those obtained and used in the Washington State Pavement Management System. Each participant should be able to perform a pavement condition survey with reasonable objectivity.

Snow and Ice Control Chemicals

September 11, Lakewood; September 23, Seattle; September 24, Wenatchee; September 25, Yakima; September 29, Spokane. No fee. Instructor: Greg Hansen, WSDOT Maintenance Office. Sessions will cover the difference between anti-icing and deicing, when each is appropriate for use, and how to use each method correctly. Also included is Total Storm Management.

Anatomy of Grant: Grantwriting

September 23-24, Lacey; October 21-22, Moses Lake; November 4-5, Snoqualmie Pass. $150. Instructor: Teena Kennedy. In this two-day workshop you'll learn practical steps to take toward grantwriting and how to approach the right funders for the dollars you need. The class will discuss writing three types of grants: federal, state, and foundations.

Contract Specification Writing (LAG Program)

September 30, Spokane; November 6, Wenatchee; December 9, Marysville. $50. Instructor: Steve Boesel. This course will provide guidance and methods for writing consistently clear, concise, complete, and well formatted contract special provisions. It will provide attendees with a thought process that can be used when writing or reviewing contract specifications to ensure the greatest possibility for a successful bid and a successful construction project. This course is for persons involved in the writing, reviewing, or enforcing of contract specifications.

Preservation of Asphalt Pavements*

October 7, Tacoma; October 9, Spokane. $100. Instructor: John Duval, Asphalt Institute. This course will familiarize attendees with the basic principles involved in the preservation of asphalt pavements. The workshop will introduce the concepts of preventive maintenance, the benefits and challenges of implementing a preventive maintenance program, and various techniques for prolonging the life of asphalt pavements. Emphasis will be on the successful planning and implementation of maintenance activities over a pavement's life rather than conducting "reactive" repairs on a "worst-first" basis. Topics will include the typical pavement lifecycle, recognizing pavement distresses, recognizing appropriate candidates for pavement preservation, and selection and execution of appropriate preventive maintenance methods. Extra attention will be given to the use of Thin Hot-Mix Asphalt Overlays as a pavement preservation technique.

Purchasing, Bidding and Contract Management

October 8, Moses Lake; October 22, Mt. Vernon; November 12, Lacey. $50. Instructor: John Carpita, MRSC. Topics include: Purchasing Policies and Procedures, RFPs vs. Bids, To Bid or Not to Bid, Prevailing Wage Issues, Bonding and Insurance Requirements, and Consultants.

Advanced Biological Assessment Preparation*

October 16, Lacey. $35. Instructor: Marion Carey. Topics include biological assessment content, information analysis, making appropriate effect determinations, and common problems found in biological assessments. It will also cover conducting Essential Fish Habitat consultations. Students will come away with an understanding of how to complete the contents of the biological assessment, such as how to define the action area, and how to make and document effect determinations. Prerequisite: Introduction to ESA and Biological Assessments, or an understanding of the ESA and some experience writing biological assessments.

Cultural Resources Workshop

September 29-October 3, The Dalles, OR. $325. Class runs from Tuesday through Friday noon. This class provides an exceptional opportunity to work with the region's most qualified instructors in cultural resources. There will be discussions on Native American perspective on cultural resources, state archaeology, prehistory of Washington, Native American ethno botany, and federal and state cultural resource regulations and how they apply to your agency. Call the WST2 office if you want to attend this training.

Design and Construction of Concrete Pavements*

October 28, Spokane. Free. Instructor: Jim Powell and Jim Tobin, American Concrete Pavement Association. The course will cover the key considerations related to design, construction, and materials for concrete streets and local roads. Topics covered will include thickness design, joint layout, construction inspection, and materials quality, proportioning, and performance. Special emphasis will be placed on ultra-thin whitetopping, a relatively new technique for overlaying urban streets, rural roads, parking areas, intersections, and light duty airports.

Writing Skills*

November 5-6, Tacoma. $110. Instructor: Jordon Peabody. This workshop is designed to reduce the confusion caused by the poorly written word. Anyone who must write on the job (but is not a writing pro) will find the training both pleasant and helpful. Writing techniques apply to letters, manuals, speeches, memos, newsletters, e-mail, proposals, reports, bulletins, and minutes.

Introduction of GPS Mapping Grade Equipment

$325. This is a special request class. Four to six students per session. Instructor: Max Schade. This is an introductory course on mapping grade GPS equipment and is taught by a Trimble-certified instructor. It is designed to provide basic knowledge and skills in the use of GPS technology in mission planning, data gathering, and data processing. The training will enable field operation personnel to use new methods and Trimble mapping grade equipment as well as understand problems encountered when using the GPS satellite constellation.

Introduction to Design and Operation of Roundabouts

September 10, Spokane; October 1, Lacey; October 2, Vancouver. (September 3 class full). Free. Instructor: Brian Walsh, WSDOT Traffic Office. In this course attendees will gain an understanding of circular intersections and understand the difference between a modern U.S. roundabout and the traffic circle and rotary intersection. Attendees will be aware of software products that can be used to do an acceptable capacity analysis and understand how to compare signalized intersections with roundabouts to determine levels of service. Intersection issues such as sight distance, drainage, pedestrians, bicycles, illumination, truck turning templates and landscaping will be discussed. Signing and striping is essential to a safely operating intersection, and the purpose for each element will be covered as it relates to the law. Attendees will also see a wide variety of operating roundabouts in Washington State and from around the country.

LAG Manual Overview

October 9, Shoreline; October 15, Spokane; October 23, Lacey. Free. Instructors: Brian Moorehead and Dick Egolf, WSDOT's Highways & Local Programs, Olympic Region. This course will give a basic overview of the Local Agency Guidelines (LAG) Manual and the latest revisions. Students will gain an understanding of the manual format and have the ability to locate guidance for their individual projects. This course is for all users of the LAG Manual.

Construction Documentation (LAG Program)

2003: November 18, Vancouver; December 2, Tacoma; December 3, Olympia.

2004: January 13, Spokane; January 27, Seattle; January 28, Seattle; February 24, Wenatchee; February 26, Kennewick; March 16, Olympic Peninsula; March 17, Olympia; April 13, Seattle; April 14, Seattle. Free.

All Northwest Region agencies should contact Dave Engle by e-mail at EngleD@wsdot.wa.gov to register. Instructor: Ken Hash, WSDOT SW Region. Regional Local Program Engineers will be in attendance to answer questions. This course

covers the three phases; pre-contract, contract, and post-contract documentation of public works projects with FHWA funding. Local agency and contractor's documentation is discussed, with a strong emphasis on the documentation requirements of the field inspector. On completion of this course, participants will have a working knowledge of: (1) Required documentation that will be submitted by the contractor, (2) Required documentation for acceptance of contract materials, (3) Daily inspector's documentation of the contract work, and (4) Source documentation for the monthly progress payment to the contractor.

Superpave Overview

Coming this fall.

2004 Classes

Bridge Condition Inspection Training (BCIT)

March 15-26, 2004, Lacey. Free to Washington State local agencies, $150 to out-of-state attendees.

Bridge Condition Inspection Update (BCIU)

February 3-4, Ellensburg; February 17-18, Lacey. Free.

Bridge Condition Inspection Fundamentals (BCIF)

February 10-12, Lacey. Free to WA state local agencies / $150 to out of state.

Basics of a Good Gravel Road

May. Three sessions. Instructor: Bill Heiden. $35

Drainage

May. Three sessions. Instructor: Bill Heiden. $35

Anatomy of a Grant: Grantwriting

March 9-10, Kelso; June 8-9, Walla Walla; September 14-15, Ellensburg; October 6-7, Seattle. Instructor: Teena Kennedy. $150

Pavement Condition Rating

May 4-5, east side; June 1-2, west side; September 7-8, west side. $45. Instructor: Bob Brooks

Local Agency Guidelines (LAG) Training

Unless otherwise stated, the courses in the LAG program are free.

- Appraisal Review: LAG Manual Chapter 25. This is a new course that has been added to the LAG program. Three sessions have recently been held, more sessions will be scheduled depending on demand. $100.
- Construction Documentation: LAG Manual Chapters 51, 52, and 53. Twelve sessions are scheduled for November 2003 thru April 2004. See page ____.
- Consultants: LAG Manual Chapter 31. Training is now offered by the University of Washington under the title "Managing Consultants." See the TRANSPEED section, page _____, for more information. Classes may be scheduled thru T2 in 2004.
- Contract Specification Writing: LAG Manual Chapters 42-46. $50. Classes now scheduled, see page _____.
- DBE/EEO/OJT: LAG Manual Chapters 26 and 27. This class will provide local agencies with a basic understanding of the rules and procedures on Disadvantaged Business Enterprise (DBE), Equal Employment Opportunity (EEO), and On-the-Job Training (OJT) for federally funded projects. There are no sessions scheduled at this time.
- Emergency Relief Programs: LAG Chapter 33. Curriculum is expected to be complete by winter 2003. The course covers instructions on procedures applicable to emergency projects funded by the Emergency Relief Program on federal-aid highways, and by the Federal Emergency Management Agency disaster assistance for projects not on federal-aid highways. This curriculum will be provided in a one-hour online training program.
- Enhancement Program: About a year away from training, waiting on a new Federal act.
- Environmental Overview for Local Agencies: LAG Manual Chapter 24. Classes have been completed for this year. More will be scheduled depending on the demand. This class is an elective in the Road and Street Management Program.
- Right of Way Procedures Workshop: LAG Manual Chapter 25 and the Federal Perspective. Classes coming this fall.
- Right of Way Plans Preparation: This is a new course in the LAG curriculum. LAG Manual Chapter 25. Eight sessions are scheduled for fall 2003. See page _____.
- LAG Manual Overview: This course will give a basic overview of the Local Agency Guidelines Manual and the latest revisions. Three sessions will be scheduled for fall 2003. See page _____.

We would like to know if you have an interest in any of these courses. You can indicate your interest by going to our web site at: *http://www.wsdot.wa.gov/TA/T2Center/T2hp.htm* and clicking on "WST2 On-Line Request." Fill out the form and send. Individual classes will be developed in response to the request lists, and if your name is on the list you will be notified by e-mail when classes are scheduled.

If you have questions about the LAG Program contact Ron Pate at PateRD@wsdot.wa.gov or (360) 705-7383, or Laurel Gray at GrayL@wsdot.wa.gov or (360) 705-7355.

The Endangered Species Act 4(d) Training Program Moves Forward

The Regional Road Maintenance ESA 4(d) training program moves forward into the new Biennium. During this past Biennium, ending June 30, 2003, the 4(d) training program was developed, launched, and about 1,200 maintenance supervisors, engineers, environmental staff, crew leads, and crew members were trained. Initially the classes were scheduled primarily for the agencies that had committed to the Regional Road Maintenance Program (RRMP) Guidelines and who have submitted a "Part 3 Application." While classes are available for anyone requesting this training, the goal of the program remains to serve all maintenance personnel who are interested in expanding their roadway maintenance knowledge and skills and in particular learn more about the improved "Best Management Practices" in roadway maintenance.

The Part 3 Application is an agency commitment to the ten program elements (of which the training program is Element #4), and can be obtained from the following web site: http://www.metrokc.gov/roadcon/bmp/pdfguide.htm or by contacting Janine Johanson at METRO KC (206) 205-7101. The ultimate goal is to have all agency roadway maintenance personnel trained under the 4(d) program and approved Part 3 Applications on file.

The University of Washington's Transportation Professional Development Program (TRANSPEED) is coordinating and presenting the training program. The current series of training tracks are described here. Fees for each track are pending a legislatively approved Agreement for the 2003-05 Biennium. Processing the Agreement is now underway and, if approved as proposed, will add funding to modify tuition rates. For program information or course registration, please contact Julie Smith at (206) 543-5539 or by e-mail: jsmith@engr.washington.edu. Those interested may also find program updates, information, and registration at: http://www.engr.washington.edu/~uw-epp/esa/reginfo.

Four ESA Training Tracks

The ESA Training Plan has been grouped into four separate tracks: (1) Briefing for Regional level decision makers; (2) a training course addressing maintenance design and technical staff procedures involved in roadway maintenance activities; (3) a training course addressing field crew practices involved in roadway maintenance activities; and (4) a course to train agency level trainers in training skills applicable to the ESA training program.

- Track 1: Briefing for Regional Decision Makers
  2 hours. No fee. An overview of the ESA program for regional level management and administration. This is a stand-alone training class and not part of the required training program and is offered by members of the Regional Road Maintenance Forum. Call Roy Harris or Gerry Crum at (425) 257-8800 for information. Information may also be obtained from the web site or by calling Janine Johanson at METRO KC (206) 205-7101.
- Track 2: Introduction, Design and BMP's, Monitoring, and Environmental Roles for Technical and Scientific Staff
  1.4 CEUs. This course is a combination of the various procedures for technical, professional and environmental staff, supervisors and leads involved in maintenance activities. The track is an overview addressing: introduction to the Guidelines, design, habitat, ten program elements and maintenance BMPs to meet ESA requirements.
- Track 3: Introduction and Outcome-based Road Maintenance
  0.7 CEUs. This course is a combination of the various procedures for field crews and leads involved in maintenance activities. The track is an overview addressing: introduction to the Guidelines, design, habitat, environmental roles, ten program elements and implementation of maintenance BMPs to meet ESA requirements.
- Track 4: Train-the Trainer for The Regional Road Maintenance Program
  1.4 CEUs. For agency-selected ESA trainers. This is the training track to train skills and techniques, evaluate, prepare, and certify candidates to teach the RRMP classroom (Tracks 2 and 3) and field demonstrations for BMP installations.

Looking to the Future

During the past year, the Regional Road Maintenance training program has been initially focused on the ESA issues related to fisheries in the Puget Sound Region. The program training has also been offered in Jefferson, Whatcom and other counties and locations. In addition, the University has been asked to furnish instructional assistance and teaming with new Track 4 trained instructors who are beginning to train within their respective agencies. The University has offered this instructional support as agencies begin to implement additional training within their agencies. The instructional support to date has been quite successful and is expected to be an ongoing viable asset to agencies seeking supplemental and/or updated program information after the initial training is completed with their office, professional staff and field crews.

Expanding the vision even further has indicated that the program may have more far reaching applications and venues. These procedures were developed by the team of state, local, and university experts to provide a comprehensive outline of good management practices applicable in any area. In further examination, it has become apparent that the procedures and training are appropriate for all roadway agencies who may be seeking a consistent and environmentally sound roadway maintenance program.

A New BMP Demonstration Training Track is being Considered for the Program

We have found that most course attendees benefit from learning the applications, procedures, and practices while working in teams of peers to develop routine maintenance techniques to evaluate the site, design and select BMPs, recognize site conditions to help implement maintenance BMPs in a short, timesaving workshop environment. This is an approach used extensively in the classroom sessions within the existing program.

Recently, the UW instructional teams have piloted a special one-day field demonstration of BMP installations where agency maintenance teams have tested various BMP limitations, analyzed installation costs and times involved, and determined the effectiveness of various BMP's and products. The pilot proved to be very successful and the evaluations will be finalized shortly. Based upon initial analysis, there is a strong certainty that this new one-day training demonstration will be added to the program and a special notice will be sent out fully describing the new demonstration track.

TRANSPEED
University of Washington

Contact: Christy Pack
(206) 543-5539, fax (206) 543-2352
http://www.engr.washington.edu/~uw-epp/

To register for a class in this section, use the contact listed above.

The prices in this section are for local agency/non-local agency.

Managing Scope, Schedule and Budget
September 10-12, Seattle. $685/$885

Urban Street Design
September 29-October 1, Seattle. $320/$520

Hydrology and Basic Hydraulics
October 1-2, Seattle. $270/$450

Determining Contract Working Days
October 7, Lakewood. $275/$375

Roadway Culvert Hydraulic Design
October 14-15, Seattle. $270/$450

Roundabout Design Concepts and Guidelines
October 15-17, Seattle. $320/$520

Fundamentals of Traffic Engineering
October 15-17, Lacey. $355/$555

Bridge Foundation Design
October 21-23, Seattle. $320/$520

Legal Liability for Transportation Professionals
October 22-23, Lacey. $270/$450

Technical Communication for Transportation Professionals
October 28-29, Seattle. $320/$520

Traffic Signal Design
November 5-7, Seattle. $400/$585

Public Works Construction Project Management
November 6-7, Seattle. $370/$550

Construction Inspection of Public Works Projects
November 3-4, Seattle. $270/$450

Work Zone Traffic Control Plan (TCP) Design
November 18-20, Seattle. $370/$570

Introduction to Retaining Wall Type Selection
November 20, Seattle. $175/$300

Pavement Design
December 2-4, Lacey. $320/$520

Traffic Engineering Operations
December 15-17, Seattle. $320/$520

Roadway Safety: Analysis, Evaluation, and Programming
January 5-6, Seattle. $320/$520

Basic Highway Capacity for Engineers and Planners
January 7-9, Seattle. $320/$520

Coming this Winter/Spring 2004
Context Sensitive Design, Seattle

Transit Capacity and Quality of Service, Seattle

Managing Consultant Project Delivery, Seattle

Engineering Professional Programs (EPP) University of Washington

Contact: Emily West
(206) 543-5539, fax (206) 543-2352
http://www.engr.washington.edu/~uw-epp/

To register for a class in this category use the contact listed above.

Cold Regions Engineering Short Course

October 30-November 3, Seattle. $1,295 early registration/$1,355 late registration.

Engineering Refresher Courses

Three evening courses provide thorough preparation for state of Washington engineering examinations.

- E.I.T./Fundamentals of Engineering Exam Review, September 3-October 13 Mondays & Wednesdays, 6:30-9:00 p.m., University of Washington campus, Seattle, $495.
- Mechanical P.E. Exam Review, September 4-October 14, Tuesdays & Thursdays, 6:30-9:00 p.m., University of Washington campus, Seattle, $645.
- Civil P.E. Exam Review, September 9-October 14, Tuesdays & Thursdays, 7:00-9:30 p.m., University of Washington campus, Seattle, $495.

Professional Engineering Practice Liaison (PEPL) University of Washington

Contact Stephanie Storm
(206) 543-5539, fax (206) 543-2352
http://www.engr.washington.edu/~uw-epp/

To register for a class in this category use the contact listed above.

Prices are for early/late registration.

Use of Constructed Wetlands for Improving Stormwater Quality

September 30, Seattle. $310 by September 16, or $345 thereafter.

Writing for Success

October 3, 10, 17, 24, 31, Kirkland. $425 by September 19, or $480 thereafter.

Hand-Built Stream Habitat (New)

October 16, Seattle. $310 by October 16, or $345 thereafter.

Improving Stormwater Management Using Low Impact Development Practices

October 26, Portland – Brownfields. $310 by October 13, or $345 thereafter.

Mentoring and Coaching Workshop

October 30, Portland – Brownfields. $310 by October 15, or $345 thereafter.

Wetland and Upland Habitat Restoration Design

November 3 and 4, Seattle. $475 by October 20, or $510 thereafter.

Storm and Surface Water Monitoring

December 2-3, Seattle. $475 by November 18, or $510 thereafter.

Drilling and Blasting Techniques

January 12-16, Seattle. $1,199 by December 29, or $1,299 thereafter.

Associated General Contractors of Washington

Contact Education Foundation
(206) 284-4500, fax (206) 284-4595
http://www.agcwa.com

To register for a class in this category use the contact listed above.

Construction Site Erosion and Sediment Control Certification

(12 hours) Designed to help implement and maintain effective Temporary Erosion and Sedimentation Control plans. Fulfills the requirements for certification in Construction Site Erosion and Sediment Control and Erosion Control Lead General Special Provision (GSP) to the Standard Specifications for Road, Bridge, and Municipal Construction. Includes WSDOT certification upon completion. Meets Department of Ecology requirements for Contractor Erosion and Spill Control Lead (CESCL) certification outlined in BMP C160 of the Stormwater Management Manual for Western Washington.

Certification training has been changed from a full two days to one and one-half days. Initial certification is $275. Certification requires successfully completing end of course exam.

Recertification requires attendance on Day 1 only, successfully completing exam, and proof of previous WSDOT certification. Recertification cost in $200. You can check your certification with the on-line database as proof of certification.

September 10-11, Seattle; October 1-2, Tacoma; October 22-23, Everett; November 12-13, Yakima; December 3-4, Seattle; January 7-8, Tacoma; January 28-29, Vancouver; February 18-19, Bellingham; March 10-11, Everett/Shoreline; March 31-April 1, Seattle; April 21-22, Tacoma; May 12-13, Seattle; June 2-3, Tacoma; June 23-24, Seattle.

AASHTO Roadside Design Guide, Web Based Training

NHI Course Number: 380032C

This web-based course is approximately 14 hours long and is available anytime - 24 hours, 365 days a year via the Internet. The cost for non-FHWA employees is $230 per participant and includes a copy of the 2002 AASHTO "Roadside Design Guide". This course provides an overview of the 2002 AASHTO "Roadside Design Guide." Emphasis is on current highway agency policies and practices. Participants must register online at www.nhi.fhwa.dot.gov/registerdl.asp

Computer Requirements: You will need a fairly recent version of a browser (such as Internet Explorer 4 or 5 or Netscape 4 with JavaScript enabled), the latest version of Macromedia Shockwave and Flash (which you can download from the Internet), and a connection to the Internet (at least 56K modem). An older computer such as a Pentium 100 would work, but it would be slower than a Pentium III. For more information visit http://www.nhi.fhwa.dot.gov

Conferences

APWA 2003 Fall Conference

September 16-19, 2003, Penticton, British Columbia. Joint conference with B.C.

Contact Bob Moorehead at TIB for further information (360) 586-1151.

12th Northwest Onsite Wastewater Treatment Short Course and Equipment Exhibition

September 22-23, 2003, University of Washington, Seattle.

Contact Christy Pack 1-866-791-1275 or (206) 543-5539.

Footprints and Bike Tracks 2003: Creating Safe and Healthy Communities

September 23-25, 2003, Red Lion Hotel, Olympia. Registration information is available at: http://www.bicyclealliance.org/

Road and Street Maintenance Supervisor's School

East: September 30-October 2, 2003, Spokane Valley

West: December 2-4, 2003, Tacoma.

Contact Kelly Newell at Washington State University 1-800-942-4978.

Northwest Pavement Management Association Conference

Fall: October 21-23, 2003, Portland. Contact Bob Brooks at WSDOT (360) 705-7352 or BrookBo@wsdot.wa.gov.

Infrastructure Assistance Coordinating Council

October 28-30, 2003, Wenatchee. For information contact Cecelia Gardener, Conference Coordinator, at (360) 725-5006 or Jacquie Andresen (360) 725-5002.

Road Builder's Clinic

March 2-4, 2004, Coeur d'Alene, ID. For information contact WSU Conferences and Professional Programs at 1-800-94-4978.

APWA 2004 Conferences

Spring: March 23-26, 2004, Westcoast/Red Lion, Olympia.

Fall: October 19-22, 2004, Kennewick

Contact Bob Moorehead at TIB (360) 586-1151.

Pacific Northwest Transportation Technology Expo

May 18-19, 2004, Grant County Fairgrounds, Moses Lake, WA. For information call the WST2 office (360) 705-7386. A video and photos can be viewed at http://www.wsdot.wa.gov/ta/T2Center/TechnoExpo/
For Mousetraps see this web site: http://www.wsdot.wa.gov/ta/T2Center/MouseTraps/

BUILD A BETTER MOUSETRAP
WST2

The "Better Mousetrap" is awarded each quarter for the most innovative working ideas presented by a public agency and published in WST2.

Award:
The best concepts will be published in the WST2 and posted on the WST2 Web Page.

Published mousetraps will receive a "Better Mousetrap" baseball cap and certificate.

Published mousetraps will be included in competition for the annual "Crystal Mouse" award.

Eligibility:
Washington State Public Agencies.

Mail To:
"Better Mousetrap"
WST2 Center/WSDOT
P.O. Box 47390
Olympia, WA 98504-7390

E-mail:
WST2Center@wsdot.wa.gov

For questions:
Dan Sunde,
Technology Transfer Engineer
SundeD@wsdot.wa.gov
(360) 705-7390

"Better Mousetrap" Submittal Form

Mousetrap Name: _____

Agency: _____

Address: _____

City: _____ State: _____ Zip+4 _____

Inventor's Name(s): _____

Phone Number: ( ) _____

Title: _____

E-mail Address: _____

Submitter's Name: _____

Phone Number: ( ) _____

E-mail Address: _____

Description of the "Better Mousetrap"

Describe the situation before the invention: _____

Describe how it works: _____

How was it built? (Include Sketches, Photos, Drawings) _____

How does it perform? _____

Please add a sketch with dimensions and materials used!
We will draw plans from them so others can build it too!

Failing Bridge or Failing Pedestrians?

Don Sunde, a recent graduate of Concordia University in Portland, OR, submitted our photo for this issue. He says it's a pedestrian bridge that crosses over I-5 in Portland near his college. Now the question he has is this: is this bridge for students who didn't do well on their finals or is it something you shouldn't drive under, let alone walk over?

Thanks, Don! Congratulations on your graduation and best wishes as you apply for medical school!

Sign of the Times

Do you have a humorous traffic sign to share? Send us a print or e-mail a digital image (preferably a 300 dpi, 1000x1500dpi jpeg or tif) and we will add it to our collection for publishing. Please provide your name, title, agency or company, and a short description of where and when you saw the sign. We want to give you credit for your participation.

You can e-mail the image to ***SundeD@wsdot.wa.gov***

Or mail the photo to:
"Sign of the Times"
WST2 Center
PO Box 47390

Please don't send your original photo. Although we will do our best to return the photo, we can't guarantee it.

Washington State Technology Transfer

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